Annual Report

For the Year Ended March 31, 1982

Alberta
ENVIRONMENT

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ENVIRONMENT

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Alberta

ENVIRONMENT

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Edmonton, Alberta, Canada
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Office of
the Minister

The Honourable G. Amerongen,
Office of the Speaker,
Legislative Assembly of Alberta

Sir:

I have the honour to hereby transmit the Annual Report of the Department of the Environment for the year ended March 31, 1982.

Respectfully submitted,

Fred Bradley

Fred D. Bradley
Minister of the Environment

OFFICE OF THE DEPUTY MINISTER

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Sherman Weaver, Ph.D.
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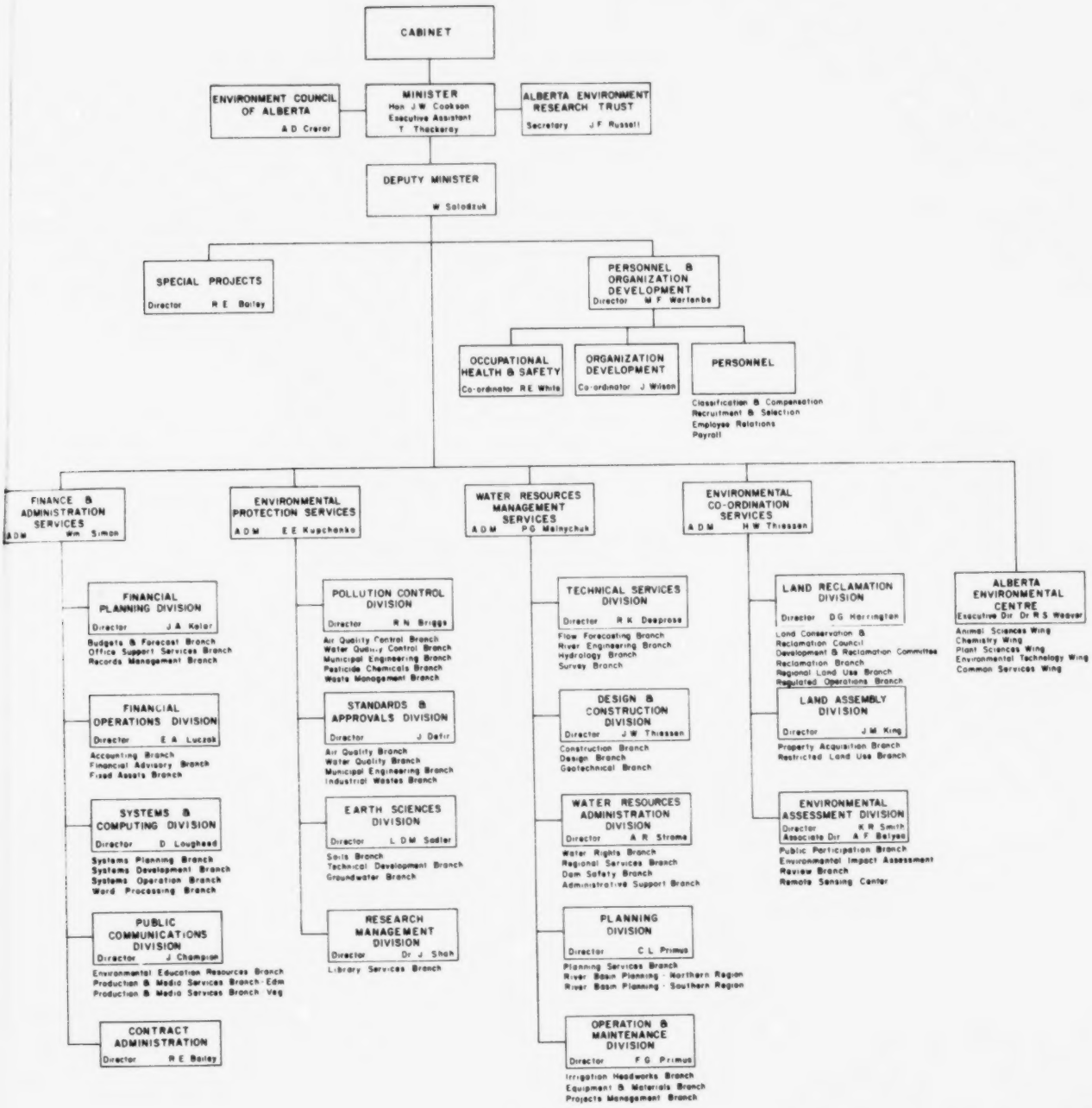
ORGCH 1382



March, 1982

ALBERTA ENVIRONMENTAL CENTRE

The Alberta Environmental Centre delivered a broad range of support programs to those departments of the Government of Alberta requiring analytical, research, and diagnostic facilities and expertise for the investigation of environmental problems.

As the major government facility for environmental research and testing for all provincial departments and agencies, most of the Centre's work was carried out for Alberta Environment, Alberta Agriculture, Alberta Energy and Natural Resources, Alberta Workers' Health, Safety and Compensation, and the Alberta Research Council.

A highlight of the year was a well attended official opening ceremony and open house. Premier Peter Lougheed officially opened the Centre, with Minister of Environment Jack Cookson and other dignitaries attending the function.

Developing and equipping of some laboratories and other facilities continued, but the Centre was increasingly able to implement its programs of environmentally-related applied research, analysis and diagnostic services.

The Chemistry Wing, for example, analyzed 12,327 water samples from throughout Alberta, mostly as a service to provincial Health Units. As well, 4,262 air samples were examined, largely in support of Alberta Environment's monitoring and regulation programs, and some 538 non-routine tests were conducted, mainly to detect the presence of organic compounds in the environment. A new microbiological identification service completed its first full year of operation, handling 426 samples.

Staff carried out a province-wide program of plant disease and insect pest monitoring, and began expanded research activities on economically important weeds, insects and plant diseases. Demand for weed, plant disease and insect identification services increased notably, with nearly 2,000 specimens submitted to Centre laboratories. As well, staff diagnosed 730 plant specimens for suspected chemical damage, an increase from 554 in the previous year.

The Chemistry Wing was also active in organizing a two-day workshop on cattle feedlot waste problems. The workshop brought together people with a broad knowledge of the cattle industry and the environment to examine feedlot research needs and priorities. The Centre also continued an active seminar program with invited speakers from across North America coming to Vegreville to exchange ideas and information on scientific subjects.

Several major research programs, investigating a number of environmental issues, were either started or continued. Among them were a survey of chemicals in fish caught in 20 major Alberta river systems, field work to determine the effects of forestry operations on sensitive wildlife species, and a pilot study on the effects of atmospheric sulphur on agriculture.

Significant steps were taken toward enhancement of interdisciplinary methods for

studying environmental problems. A series of planning exercises, based on the role of biocides in Alberta, was conducted to advance the Centre's cross-disciplinary approaches to research.

Major developmental projects included completion of the Services Building, and construction of a chemical waste storage lagoon. Plans for construction of greenhouses, a self-contained inhalation toxicology facility, an additional emergency power generator and new laboratory areas were approved. Significant progress was made in developing water treatment facilities to supply the high-quality water needs of all laboratories, especially the aquatic biology areas.

As well as the regular agricultural extension duties carried out by the Plant Sciences Wing, senior Centre staff participated in several public information seminars on hazardous waste disposal.

The Centre took the lead in development of a new job classification scheme, adopted late in the year for laboratory technicians. Active recruitment of staff continued with the addition of 23 people to the permanent staff list at year's end.

ANIMAL SCIENCES WING

Considerable progress was made in planning and completion of physical facilities, implementation of laboratory services, and planning and implementation of research operations. Recruitment of professional staff progressed well except in a few key areas.

Completion of the Services Building allowed a start on assembly of the water treatment plant and provided much-needed shop facilities for servicing site and field equipment. Additional laboratory and office facilities were completed in the main building and a containment laboratory was approved for inhalation and genetic toxicology programs. Planning continued on experimental facilities for wild, domestic and laboratory animals.

The Centre's Management Committee classified the work of the wing into eight service programs and 11 research programs. All service programs were operational. Most research programs were implemented, with several major studies in full operation.

Aquatic Toxicology: Field sampling of 20 major river systems in Alberta was completed. Chemical analyses for selected environmental chemicals were completed on about 900 fish tissues. A few areas of potential concern were identified and additional sampling of sediments and water was conducted to define in greater detail the source and extent of identified contaminants. Liver, gonad, and brain tissues were examined for abnormalities and changes in lipid and carbohydrate metabolism.

About 30 bioassays were carried out for regulatory agencies using juvenile rainbow trout (Salmo gairdneri).

Environmental Chemistry of Wastewaters: Juvenile rainbow trout were used to examine the effects of dissolved and suspended fractions of wastewater from two industrial sites. Effects of benzene hexaclorocylohexane (lindane) on survival and early development of rainbow trout were also studied.

Genetic Toxicology: A genetic toxicology program was established to use both in vitro cell culture systems and laboratory animals to investigate the ability of selected environmental chemicals to induce changes in chromosomal structure. Work consisted of program planning and developing containment laboratories for work with potentially mutagenic substances.

Problem Wildlife Research: Research continued on methods of controlling pocket gopher (Thomomys spp.) depredation of forage land using headlands to protect newly-established legume fields. Relationships between grazing intensity and pocket gopher abundance were also examined. Other studies included an evaluation of factors predisposing domestic sheep flocks to coyote (Canis latrans) predation and a population comparison of coyotes on native grasslands and those on adjacent agricultural lands in southeastern Alberta.

Environmental Physiology: Planning was carried out in co-operation with Alberta Energy and Natural Resources and the University of Alberta for a large field research facility where the effects of environmental changes on the health and productivity of wildlife and on natural ecosystems can be studied in detail over long periods. A preliminary study on the proposed site began investigating feed intake and resource use by native wild ruminants under natural conditions. A study of seasonal physiological changes related to environment-animal interactions continued as a co-operative venture with the staff of Elk Island National Park. The field phase of a study of distribution and nutritional qualities of moose browse was completed. Analysis of collected materials and data was started.

Forest Development and Wildlife Resources: The first year of field work on this study was completed in the Berland River area of west-central Alberta. The objective is to assess the effects of major forestry development projects on sensitive species of wildlife. In this study, grizzly bears (Ursus arctos horribilis) are used as an indicator species. Sixteen grizzlies and four black bears (Ursus americanus) were captured and fitted with radio collars and tracked by aerial monitoring until denning time in the fall. Behaviour of the animals was determined with regard to habitat preference and impending industrial development. As well, microbiological, hematological, biochemical and morphological data was obtained from the captured animals.

Inhalation Toxicology: Work in 1981-82 consisted of planning for the physical facilities, exposure equipment and monitoring systems required for a program of inhalation research. An initial set of exposure chambers for small laboratory animals was acquired and work began on baseline studies of air flow and normal physiological parameters. Discussions continued with client departments on identifying which gases, dusts and vapours should be given first research priority.

Effects of Environmental Sulphur: The objective of this study is to assess the effects of long-term, low-level atmospheric sulphur emissions on agricultural productivity. A pilot study was carried out in west-central Alberta to examine complaints by area livestock producers. Work consisted of epidemiological and field sampling studies of selected herds and involved chemical and physical analyses of soil and plants, theoretical and actual measurements of sulphur deposition and trace element nutrition, biochemistry and enzyme kinetics in the selected cattle herds.

A one-day workshop was held with representatives of the other participating departments to assess results of the pilot study and design the next phase of the work. It was agreed that the level of public and departmental interest was sufficient to continue the work, although it was recognized that a definitive answer may be difficult to achieve.

Toxicology of Biocides: Wing staff participated in a series of planning exercises to determine biocides which might have the greatest consequence to Alberta and which have poorly understood long-term effects on health and reproduction. A major effort to complete this process and initiate studies of selected biocides is planned for 1982-83.

Program Development: Programs in the planning and development stage included aquatic habitat studies, chemical safety evaluation, toxicology of petrochemicals and fossil fuels, furbearing animal research and ecological toxicology.

Service Programs: Wing service programs represent activities required to support programs in environmental toxicology or natural resource related programs. Consulting services in aquatic and wildlife biology and environmental toxicology were provided to other Centre programs, to client departments and to outside individuals and agencies.

SITE SUPPORT SERVICES

The Site Support Services Section began establishing permanent plot areas for several research programs. A soil survey project began on those areas to provide baseline data for future projects.

Several other Centre research programs were assisted with manpower, materials or equipment from the section. Temporary livestock pastures were fenced off and cattle and feed were acquired for the environmental sulphur and biocide toxicology programs. Seed, fertilizer, manpower, and seeding and harvesting equipment were provided for the Pest Management Group.

In August, the section assumed responsibility for 11 hectares (27 acres) of newly-landscaped grounds surrounding the Centre buildings. In spite of a dry summer, water rationing and a severe winter, a high rate of survival was achieved for newly-planted trees and shrubs in this area. As well, shelter belts were reworked and seeded to grass. As the year ended, the shop facility in the Services Building was completed, enabling the section to improve vehicle and equipment maintenance.

CHEMISTRY WING

Chemical analysis services were provided to client departments, but the largest single contribution was a direct service to the public through the Provincial Health Units. More than 10,000 drinking water samples were tested for a total of some 170,000 constituents (see Table 1).

More than 20 new methods of chemical analyses were developed or adapted from standard sources, increasing the range of services offered.

Among the major pieces of service equipment acquired and put into production was a gas chromatograph coupled mass spectrometer that enables the Centre to check for trace amounts of carcinogenic materials in environmental samples, especially drinking water and air.

About 60 people attended a Centre workshop on cattle feedlot waste management. Presentations and discussions by representatives from government, universities and the private sector were designed to ensure that relevant environmental problems were identified and that action is being taken to solve them.

Staff was maintained at a level of about 50 positions. A number of replacement staff was hired, but filling some highly-specialized positions continued to prove difficult.

The Centre made a substantial contribution toward the government decision to establish a new system to classify laboratory technician positions. The new system is aimed at enhancing the status and careers of technical staff.

Chemistry Wing facilities were continually improved, especially as they related to the health and safety of laboratory workers. A major advance was the completion of proper chemical storage facilities in the newly-finished Services Building.

PLANT SCIENCES WING

The Pest Management Group of Plant Sciences provided diagnostic and extension services for Alberta Agriculture and agricultural producers, mainly in the north-central and north-eastern regions. Applied research and survey activities were conducted province-wide where necessary; other projects were carried out on test plots at the Centre in Vegreville and/or on plots in the fields of co-operating landowners in areas where disease, insect, or weed problems occurred.

Entomology: The Entomology Section processed 592 insect diagnostic specimens and provided insect control information, on request, to agricultural producers, horticulturists, government agencies and Provincial Health Units across Alberta. Applied research projects were conducted on the chemical control of horn flies, house flies, flea beetles, bertha armyworms, and on the biological control of greenhouse

TABLE 1

Alberta Environmental Centre

Chemistry Wing

Samples Received April 1, 1981 - March 31, 1982

Sample Type	Total
Water Analysis & Research Section:	
Surface and Groundwater	1,162
Industrial Waste Matter	203
Municipal Waste Matter	390
Water for Human Consumption	10,174
Sediments	323
Cattle Blood	75
Total Samples Received	12,327
Total Tested Constituents	198,041
Air Analysis & Research Section:	
Stack Emissions	196
Samples for Ambient Air Quality Monitoring	3,053
Precipitation (incl. Acid Rain)	336
Vinyl Chloride	660
Inter-laboratory Quality Control	17
Total Samples Received	4,262
Total Tested Constituents	15,589
Research Services & Methods Development Section:	
Hydrocarbon, Pesticide, PCB, Miscellaneous	538
Total Tested Constituents	538
Microbiology Section:	
Total Samples	426
Total Parameters Tested	501
OVERALL TOTAL SAMPLES RECEIVED	17,553
OVERALL TOTAL TESTED CONSTITUENTS	214,669

insect pests. Field surveys were conducted on horn flies on range cattle, bertha armyworms and root maggots on canola, elm bark beetles (carriers of the Dutch elm disease fungus), and on insect carriers of potato diseases. A swine mange survey was initiated.

To improve monitoring capability for outbreak forecasting, a laboratory study was started on the characterization of different populations of bertha armyworm in Alberta. A field study on the economic impact of horn flies on range cattle productivity was initiated. Six section reports on chemical efficacy trials were published in the 1981 Pesticide Research Report of the Expert Committee on Pesticide Use in Agriculture, compiled and published annually by Agriculture Canada.

Plant Pathology: The Plant Pathology Section processed 1,027 specimens for plant disease diagnoses. These included cereal, oilseed, ornamental, vegetable and greenhouse crop production problems. There was a considerable increase in some diseases, notably bacterial head blights of wheat and fireblight of apples, crabapples and mountain ash.

The section participated in province-wide surveys of verticillium wilt of alfalfa and blackleg of canola. Field-scale demonstrations on control of white mold of canola

were conducted in co-operation with Alberta Agriculture; effective control of the disease by aerial application of benomyl fungicide was evident. Clubroot of crucifers, found in Alberta for the first time in 1980, is a potentially serious threat to canola. Its winter survival in Alberta soils was confirmed.

Extension seminars and lectures on plant diseases and their control were presented to agriculturists and horticulturists. The section participated in an interdisciplinary project on the effect of environmental sulphur on alfalfa. Research projects were planned in co-operation with Agriculture Canada or Alberta Agriculture on control of root rot of cereals, control of seedling blight of canola, and diseases of alfalfa, especially alfalfa decline. Section staff presented two papers at scientific meetings.

Weed Science: The Weed Science Section provided services in weed identification (315 specimens) and chemical damage investigation (730 specimens) to Alberta Agriculture, Alberta Environment and the public. Section staff took part in six in-service training courses on weed identification and control, and contributed to an Alberta Agriculture publication, Weeds of Alberta. The section conducted greenhouse testing of samples collected by Alberta Environment and Alberta Agriculture in a province-wide survey for picloram residues, in response to concerns that the chemical accumulates in roadside sloughs after use of weed control sprays along roads.

Research activities included laboratory and field experiments on germination of weed seeds, control of grassy and broadleaved weeds in field crops, control of volunteer cereals in rapeseed, barley varietal tolerance to herbicides, effects of herbicide carry-over on rotation crops, and biocontrol of leafy spurge and perennial sow-thistle.

Field work included the release of beetles and flies for biological control of leafy spurge and perennial sow-thistle in environmentally sensitive areas such as river banks. The insects used in this work are screened, imported, tested, and cleared for release by Agriculture Canada. Fifty-eight abstracts of field tests appeared in the 1981 Research Report of the Expert Committee on Weeds (Western Section) published by Agriculture Canada.

Reclamation: The Reclamation Group, though still under organization, became involved in one major study on vegetational response to pipeline installation through native range in southern Alberta.

A reclamation project entitled Ecosystem Reconstruction and Stabilization Following Pipeline Construction Through Solonetzic Rangelands was initiated. This project is part of a graduate student program with the University of Alberta under the auspices of the Centre. The objectives are to document and assess ecosystem responses to changes in physical, chemical and biological soil characteristics and to study subsequent soil-plant interactions.

The study area takes in five pipelines of different ages. The 1981 Alaska Highway Pipeline will provide data on the immediate effects of the disturbance. The oldest pipeline, installed in 1957, and the other three lines will provide data on succession and ultimate ecosystem stabilization over time. Instruments have been installed to monitor soil temperature at various depths and distances from the newest pipeline. Probe access tubes were installed to allow soil moisture readings to be taken at various depths.

ENVIRONMENTAL TECHNOLOGY WING

Although the major programs of the wing remained in the planning phase, considerable progress was made in a number of areas. The Geochronology Section facilities were completed and work progressed toward implementing routine radiocarbon and tritium analysis procedures. Routine servicing of analytical instrumentation for the Centre was carried out by the Instrumentation and Controls Section, which also began to develop some custom-designed equipment. For example, 60 remote bear trap monitors to be used in the Wildlife Biology Program and a light control device to simulate sunrise and sunset in the aquatic biology laboratories were constructed. This section also helped with the commissioning of the custom liquid scintillation counters in the Geochronology Section.

The wing took over the operation and further development of the laboratory wastewater treatment system. Long-term storage lagoons for the containment of the Centre's difficult-to-treat chemical wastes were commissioned. The wastewater discharged from the Centre is sampled and analyzed before final disposal and an extensive data recording system, which will be computerized, was implemented.

The wing completed a reverse osmosis water-treatment system to supply the laboratories with pure water and successfully operated it, providing up to 99 per cent removal of contaminants. Work started on a 400,000 litres-per-day wastewater treatment plant for the aquatic biology laboratories, where 90 per cent of the water utilized will be treated and recycled. The work on this project, which will continue for another year, includes evaluation of treatment processes and design and construction of automated monitoring, data-collection and control systems.

The wing was involved in public information seminars on hazardous waste disposal, particularly with regard to technological processes. In this connection the wing commenced a technology development program which will evaluate the suitability of new and existing hardware and processes for application in hazardous waste disposal in Alberta.

The wing continued its activities in staff recruitment and equipment purchasing as well as in program planning. Three professionals and three technicians were hired in permanent positions. Two key senior professional staff positions remained

vacant for the second year, reflecting continuing salary problems and a difficult job market in some fields.

COMMON SERVICES WING

This wing continued to provide administrative and support services to the entire Centre. In addition, staff was actively involved in planning and preparation for the Centre's official opening on June 12, 1981.

Administrative Services: Major activities of the wing were in the preparation of final documents for budget submissions and the monitoring and supporting of annual budget expenditures. Administrative services for the Centre included the investigation and procurement of word processing and photocopying systems, the forecasting of expenditures and the hiring of a public affairs officer.

In an orientation program developed by the wing, new staff members are acquainted with the various services offered, particularly by the Common Services Wing. All staff members have taken part in an orientation session.

Communications: Distribution of a monthly internal newsletter began in March, and a quarterly external newsletter was planned.

Financial Services: In the Financial Services Section, accounts payable staff reduced a significant backlog of invoices with the help of a monthly invoice aging report. A monthly reconciliation of purchase orders and payments was also started.

The Financial Services Section administers central stores and central duplicating operations. Central stores staff began designing an inventory control system for all consumables entering the Centre. This system will be implemented in the newly-completed Services Building. Overall, the service offered by central stores improved due to the hiring of permanent staff and streamlining of document flows. In addition, central stores staff performed a fixed asset count which succeeded in reconciling all but 0.5 per cent of these assets to the fixed asset list.

Wing staff members began preliminary planning on a management information system to be used by Centre management. Proposals were written and a pilot project was planned for the next fiscal year.

Personnel Services: Staff recruitment was one of the major responsibilities of the Personnel Services Section. There were 48 staff commencements and 25 terminations for a net gain of 23 permanent staff members, bringing the total for the Centre at the end of March, 1982, to 130. Section staff were involved in the design of training programs at the Centre. A major effort was in finalizing the laboratory technician series review. An occupational health nurse position was classified and advertised with recruitment expected in the next fiscal year.

Information Services: The Information Services Section is responsible for operation of the Centre library; maintenance of a central filing system for the Centre; provision of mail service; publication of an environmental inventory and bibliographies; and editing of in-house documents upon request. Support to the Canadian Plains Research Centre in Regina for the computerized version of the publication, Persons Involved In Environmental Research in Alberta, was withdrawn in March, 1982. However, the manual version of this data base was maintained and printed again.

The library collection contains more than 7,500 catalogued items which include books, journals, microfilm, film and multi-media kits. The library relied heavily on a computerized catalogue support system for copy cataloguing, computer output microform (COM) catalogue production, verification of requests and interlibrary loan functions. All reprints acquired from sources outside the province were maintained in a reprint file. Access to this file was provided by a computerized key-word-out-of-context (KWOC) index.

The Central Records Office conducted inventories of all Centre files. These are being classified, indexed and incorporated into the central filing system. An online and printed KWOC index is being developed to give centre staff access to these files.

PERSONNEL AND ORGANIZATION DEVELOPMENT

The division provides the department with personnel, safety and development services through a staff of 15. This includes seven professionals, with one personnel administrator located at the Alberta Environmental Centre in Vegreville.

The division has three branches -- the Personnel, Organization Development, and Occupational Health and Safety Branches -- co-ordinated by the director.

PERSONNEL BRANCH

The Personnel Branch handles recruitment, classification, pay and benefits administration, and employee relations for the department. As of March 31, 1982, the department had 1,257 salaried positions. Of these positions, more than half are located in Edmonton with the remainder in field offices throughout the province. Major field offices are located in Vegreville, Lethbridge, Calgary, Grande Prairie, Peace River and Red Deer.

During the year, 252 salaried and 160 wage employees started with the department, 164 salaried and 246 wage employees terminated their employment, and 32 were transferred to other departments in the provincial government.

In recruitment, 236 competitions were held with 32 re-advertised, an increase of 11 per cent over the previous year's total of 213 competitions. The increased branch activity was partly because of the addition of 19 salaried positions and the need to conduct several recruitment campaigns for many hard-to-fill positions. These campaigns were conducted for scientific and technical positions at the Alberta Environmental Centre in Vegreville and engineering and technical positions throughout the province. Nation-wide advertising was undertaken for engineers, scientists, and technical staff, with most new recruits being hired from within Alberta or from Ontario.

In classification, many organizational changes took place resulting in 385 classification decisions on individual positions. Organizational changes included the reorganization of Finance and Administration Services and Water Resources Management Services, as well as the creation of the Operation and Maintenance Division.

The services provided in the areas of pay and benefits and employee relations continue to be important in the overall activities of the division.

ORGANIZATION DEVELOPMENT BRANCH

The branch is responsible for meeting staff development needs consistent with the achievement of organizational goals through a range of staff development programs and appraisal systems. While most development programs took the form of short courses, several employees received course subsidization for educational programs taken on their own time and some employees took educational leave. Educational leave was necessary for some employees to satisfy the residency requirement on job-related academic upgrading programs. Candidates

were successful in negotiating theses which were departmental projects.

The demand for branch services was high and participation increased in both internal and external courses. Programs offered by the branch for the first time included a money auditing seminar for executives, an enforcement training course for the Regional Services Branch of the former Water Resources Management Division, and a time management course. Special sessions were arranged in media relations, management development and receptionist training. A half-day program on stress management was developed for internal delivery. An orientation program for secretaries was designed. This program is being delivered by the deputy minister's executive assistant. Film presentations, supported by a discussion of the key concepts, were offered throughout the department on the topics of time management, supervision and effective meetings.

Mid-probation assessments and exit interviews were initiated within the employee-appraisal systems. Several appraisal seminars were offered. These seminars were most effective where the line managers recognized a need for improvement and took an active role in the seminars. Overall administration and review functions were maintained.

The incidence of employees seeking career guidance and of supervisors requesting assistance in dealing with problem employees increased over the year. The co-ordinator of the branch served as chairman of the department's 1981 United Way campaign, as the department's representative on the International Year of the Disabled Persons committee and on the Interdepartmental Standing Committee on Human Rights.

OCCUPATIONAL HEALTH AND SAFETY BRANCH

The Alberta Government Safety Program, The Occupational Health and Safety Act and Regulations and the department safety program are administered through the department Safety Branch which provides the necessary resources and services.

The department is supported in its program by having representatives of the Alberta Union of Provincial Employees sitting as members of the department Safety Committee. The committee is chaired by the deputy minister with the Executive Committee and personnel director representing management. Occupational Health and Safety concerns as presented from the various joint work site safety committees are acted on. The department Safety Committee believes that co-operation and safety awareness are vital in a successful safety program.

The injury frequency rate (injuries per 1 million man hours) of 16.81 and the injury severity rate (days lost per 1 million man hours) of 98.32 during the year continue to be less than normal public service levels. These favorable rates are attributable to employee awareness and concern for job safety, and the support given to the Government Safety Program by the department.

FIGURE 1

POSITIONS BY CATEGORY

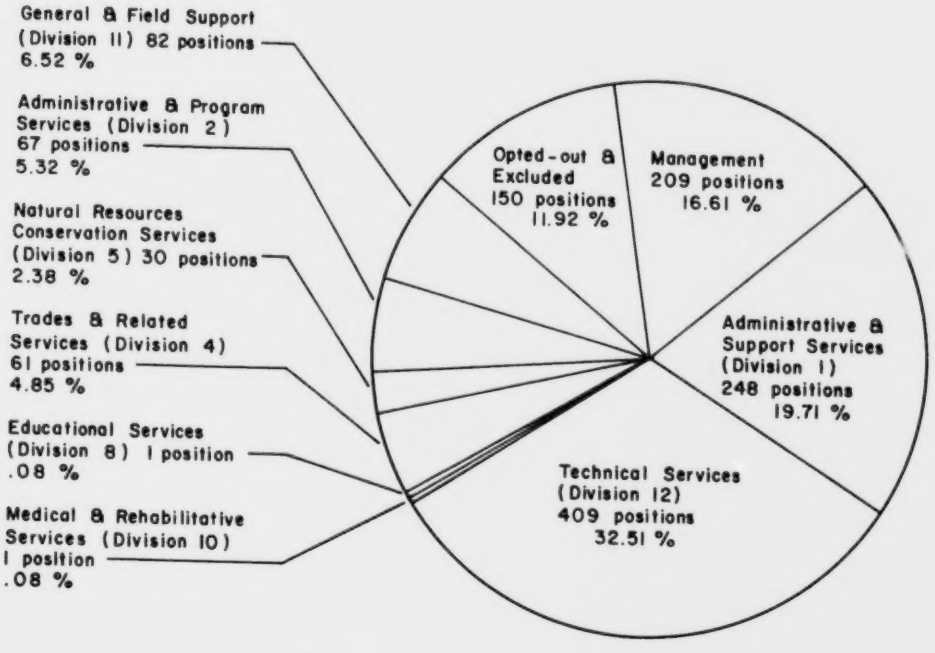


FIGURE 2

EMPLOYEE LOCATIONS

LOCATION	No. OF EMPLOYEES
EDMONTON	735
VEGREVILLE	160
LETHBRIDGE	122
UNASSIGNED	66
CALGARY	53
GRANDE PRAIRIE	25
PEACE RIVER	25
RED DEER	23
SPRING COULEE	13
FORT MACLEOD	6
FORT CHIPEWYAN	6
TWO HILLS	5
FORT McMURRAY	4
ARROWWOOD	3
MEDICINE HAT	3
ST. PAUL	2
WHITECOURT	1
CAMROSE	1
HANNA	1
EDSON	1
ENCHANT	1
WAINWRIGHT	1
TOTAL	1257

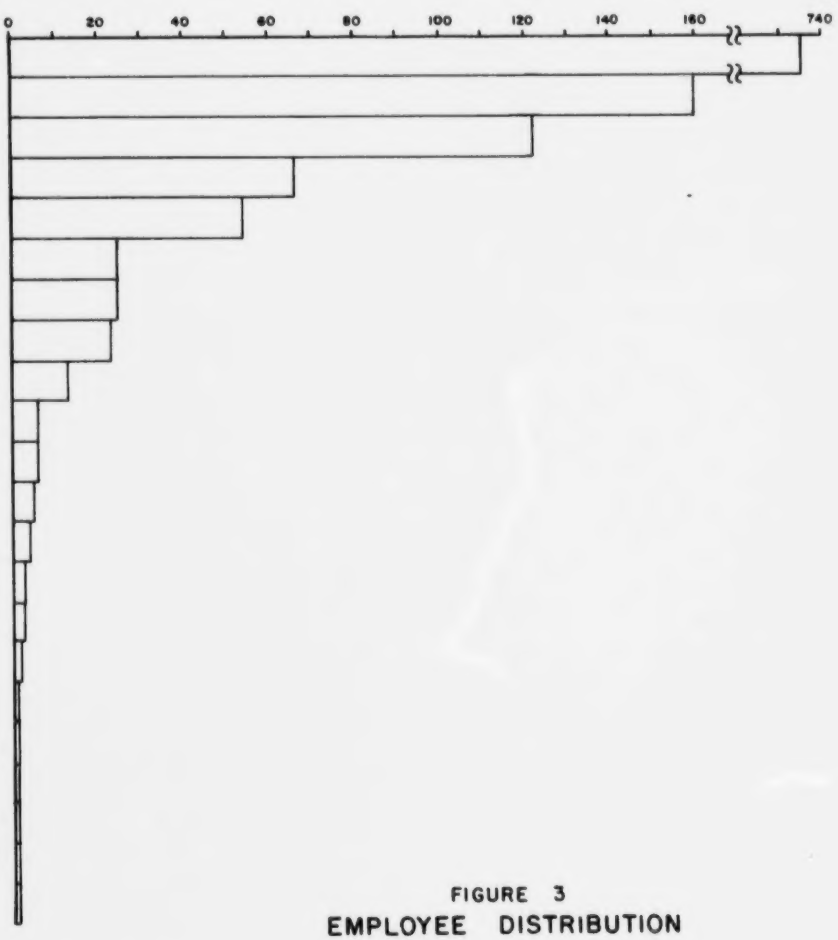
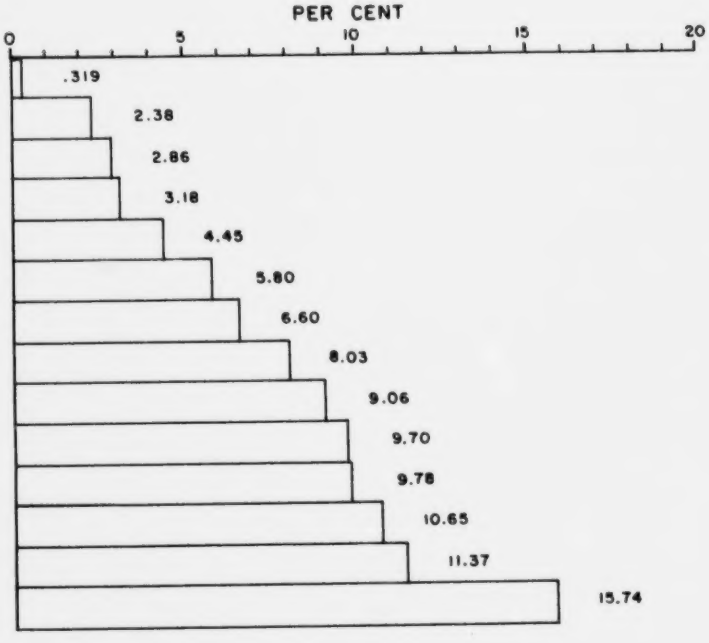


FIGURE 3

EMPLOYEE DISTRIBUTION

	No. OF EMPLOYEES	PER CENT
OFFICE OF THE MINISTER	4	.319
OFFICE OF THE DM AND ADMs/ SPECIAL PROJECTS/ PER. ORG. AND DEV.	30	2.38
STANDARDS AND APPROVALS	36	2.86
RESEARCH MANAGEMENT	40	3.18
PLANNING	56	4.45
FINANCE AND ADMINISTRATION	73	5.80
EARTH SCIENCES	83	6.60
WATER RESOURCES ADMINISTRATION	101	8.03
OPERATION AND MAINTENANCE	114	9.06
ENVIRONMENTAL CO-ORDINATION SERVICES	122	9.70
TECHNICAL SERVICES	123	9.78
DESIGN AND CONSTRUCTION	134	10.65
POLLUTION CONTROL	143	11.37
ALBERTA ENVIRONMENTAL CENTRE	198	15.74



SPECIAL PROJECTS

PRAIRIE PROVINCES WATER BOARD (PPWB)

The Prairie Provinces Water Board, established in 1948 by a federal-provincial agreement and reconstituted in 1969, consists of representatives from the governments of Canada, Alberta, Saskatchewan and Manitoba. Its function is to administer the 1969 apportionment agreement on water flow in the Saskatchewan River system among the three member provinces and make recommendations on interjurisdictional water matters related to its terms of reference or referred to it.

Apportionment Administration: The report on the Administration of the Apportionment Agreement, under preparation since 1975 by the board's Committee on Hydrology, and a supplemental document entitled Guidelines for Negotiating Equitable Apportionment were submitted to the ministers of each of the jurisdictions represented on the PPWB. The report was the product of some 11 years of experience by the board in the administration of the master agreement on apportionment of eastward flowing streams through the provinces of Alberta, Saskatchewan and Manitoba.

The report contained a number of recommendations. Of those pertaining to Alberta, the most significant were: (1) that on the North Saskatchewan River, no audit or balance periods of less than 12 months and no minimum discharge criterion be established at present, and that apportionment flows continue to be reported on a calendar-year basis; and (2) that for the South Saskatchewan River, flows be audited on a quarterly basis reverting to a one month or less basis when recorded flow drops below 42.5 m^3/s (cubic metres per second) but that no balance period of less than 12 months be established at this time and that apportionment flows continue to be reported on a calendar-year basis.

The Guidelines for Negotiating Equitable Apportionment set forth some principles and procedures to assist the provinces should low flow situations arise on interjurisdictional waters that may require negotiation.

The measured volume of water flow, the computed volume of natural flow, and the percentage of natural flow represented by the measured flow which passed from Alberta into Saskatchewan in the North and South Saskatchewan rivers during the 1981 calendar year, are as follows:

TABLE 2

Flow in Cubic Decametres

	Measured	Natural	%
N. Sask. R.	7,702,000	7,796,000	98.8
S. Sask. R.	9,318,000	10,750,000	86.6

In 1973 the PPWB established a committee to determine how the master agreement on apportionment might be applied to the interprovincial apportionment of water in Battle and Lodge Creek Basins. This was a formidable task inasmuch as the waters of these basins are not only interprovincial, but also international and subject to the Boundary Waters Treaty of 1909. Water use in these basins dates back to the early 1900s and, because of the arid nature of the area, has grown steadily over the years. Prior to 1956, annual water use and recorded stream flow were shown in the annual report of the International Joint Commission, but apportionment of the basins was not formally reported. The method of water allocation to users by the provincial water rights administrative agencies eventually resulted in some portions of the basins suffering varying degrees of water shortage during years of lower-than-normal flow.

In 1981, the PPWB received and adopted the report and recommendations developed by the committee. The board subsequently prepared an amendment to the 1969 apportionment agreement for ratification by the member provinces. This amendment would give effect to the recommendation that "the annual flow of each of the three water courses known as Battle Creek, Lodge Creek, and Middle Creek be apportioned at the Alberta-Saskatchewan boundary with Alberta permitting a quantity of water equal to 75 per cent of the natural flow of each water course to flow into the province of Saskatchewan".

Water Demand Study: Initiated in 1978 to measure current water demand for agricultural, municipal, industrial, power and recreational purposes, this study was nearing completion by the end of the fiscal year and a draft of the final report was ready for review by the PPWB. To accommodate the review, editing, and printing of the reports, the PPWB extended the study completion date to September 30, 1982.

Water Quality:

Water Quality Network -- In 1978, the board's Committee on Water Quality recommended that member agencies work toward the implementation of the first order, long-term water-quality network as documented in the Prairie Provinces Water Board report number 51. This recommendation was forwarded to the ministers of the PPWB member agencies and received unanimous support.

In the following years, further deliberation on the subject of water quality led to the consideration of federal-provincial water-quality agreements. In 1981, Environment Canada requested permission from the federal treasury board to negotiate water-quality agreements similar in nature to the existing federal-provincial hydrometric monitoring agreements. If approved, Environment Canada could proceed to negotiate agreements with each province. The agreements would provide for water-quality monitoring, data exchange, data storage, the exchange of standard reference material, the development of co-operative quality assurance programs, and the sharing of analytical specialty services.

Water Analysis Compatability -- Work undertaken by the Committee on Water Quality toward a plan for assessing the compatability of analytical methods used by the water-quality laboratories of the board's member agencies was presented to the PPWB in 1981. The committee recommended that the board utilize the interregional bimonthly quality assurance program being conducted by Environment Canada's Burlington Quality Assurance Group to assess the compatability of analytical water-quality results from the water-quality laboratories of member agencies. It also recommended that member agencies arrange for their water-quality laboratories to participate in the federal program.

The recommendation was accepted by the board. Subsequently, Environment Canada, in its submission to the federal treasury board regarding the establishment of federal-provincial agreements on a water-quality network, included reference to the proposed program.

Water Quality Objectives -- The Committee on Water Quality began the preparation of a report entitled PPWB Water Quality Procedures which could be used by the PPWB to address its interprovincial water quality management responsibilities outlined in the 1969 apportionment agreement. This report and the committee's recommendations will be submitted to the PPWB in 1982.

Miscellaneous -- Other subjects addressed by the Committee on Water Quality included the exchange of information on analytical methods for pentachlorophenol, the proposed Cold Lake oil sands plant, the Tobin Lake toxic substances study, and monitoring requirements for determining the dissolved oxygen concentrations on the Birch River below the Cumberland Lake Ducks Unlimited project.

Hydrology: The board's Committee on Hydrology addressed a number of items during the year. The PPWB accepted its report and recommendations related to the natural flow study on Boxelder and MacKay Creeks. This marked the completion of five small basin natural flow reports. Studies continue on Gainsborough Creek, Big Gulley Creek, Eye Hill Creek, Battle River and Beaver River.

In 1980, the board agreed that the Committee on Hydrology should consult with hydrological specialists and advise the board on how an applied hydrology research program might be developed to determine the effects of artificial drainage on downstream flows in prairie streams. The committee reviewed techniques and approaches used in Canada and the U.S. that might be applied to situations in the prairie provinces. The committee will observe the progress of various studies to see if the research techniques would be applicable to drainage projects which may have a significant impact on the quality or quantity of flow in interprovincial streams.

Groundwater: Subsequent to the 1979 establishment by the board of an Ad Hoc Committee on Groundwater, the committee was ratified as a standing committee after the

ministers of the member agencies made the board responsible for the consideration of interprovincial groundwater management, except apportionment, on a continuing basis.

The committee's first assignment was the preparation of a bibliography of information on groundwater along the Alberta-Saskatchewan and Manitoba-Saskatchewan boundaries.

In relation to a proposed plan by Esso Resources to use deep wells for the disposal of some plant wastes in the extraction of oil sands at Cold Lake, a consultant was engaged to outline the investigations needed to determine the implications of deep well waste disposal, particularly with respect to interprovincial groundwater concerns. The consultant's report was referred to the Committee on Groundwater for assessment and advice to the board.

MACKENZIE RIVER BASIN

The Mackenzie River Basin Study, initiated in 1978 by a federal-provincial agreement, has been conducted by the Mackenzie River Basin Committee with representation from the jurisdictions of Canada, the Northwest Territories, the Yukon, British Columbia, Alberta and Saskatchewan. The study, designed to increase understanding of the water and related resources of the basin, their interdependencies and the implications of water resources development, was intended to facilitate future co-operation in planning and management for the best use of these resources.

The main report of the study was concluded and presented to the ministers of the Mackenzie Basin committee member agencies at a meeting in Edmonton in February of 1982. Nine supplementary reports were at the printing stage.

The ministers accepted the report and its recommendations. Significant recommendations called for:

-- conclusion of an agreement among jurisdictions through which transboundary water management issues can be addressed at boundary crossing points of streams in the Mackenzie River Basin, and which establishes a permanent board to implement provisions of the agreement;
-- implementation of an integrated long-term network of hydrometric, snow, metrologic, sediment, and water quality stations as proposed in the report; and
-- initiation of a comprehensive study of the Mackenzie Delta and continuation of monitoring and analysis of the processes involved in spring breakup and sediment transport in the Liard River sub-basin, with extension of this portion of the study to include the Mackenzie River from Fort Simpson to its mouth.

The Mackenzie Basin committee is to develop specific programs for the implementation of the recommendations for further consideration by the ministers.

PEACE ATHABASCA DELTA

Following the completion of a study into the needs for fishways at the Riviere des Rochers and the Rivillion Coupe water-level control structures in the Peace Athabasca Delta, plans for the design, fabrication and testing of fishways were implemented during 1981. These structures will be in place for hydraulic testing and assessment of effectiveness in the spring of 1983.

A consultant was engaged to prepare a report on the findings of the five-year monitoring program which federal and Alberta provincial agencies initiated following the construction of the Riviere des Rochers and Rivillion Coupe water-level control structures in 1976. The objectives of this program were to assess the effects of the control structures on the environmental characteristics of the Delta and to determine the effectiveness of the structures in restoring conditions to resemble those before the construction of the Bennett Dam on the Peace River in British Columbia. The report will be completed during 1982.

FINANCE AND ADMINISTRATION SERVICES

William Simon, RIA
Assistant Deputy Minister

J. A. Kolar
Director
Financial Planning Division

E. A. Luczak
Director
Financial Operations Division

Dave Lougheed
Director
Systems and Computing Division

Jacquie Champion
Director
Public Communications Division

R. E. Bailey
Director
Contract Administration

Finance and Administration Services are responsible for providing the department with a variety of administrative and support functions in five areas: Financial Planning, Financial Operations, Systems and Computing, Public Communications and Contract Administration. These five major areas report directly to the Assistant Deputy Minister of Finance and Administration Services.

The Assistant Deputy Minister of Finance and Administration Services is the senior financial officer of the department. He is responsible for the efficient operation of the Finance and Administration Services and for the department's overall financial and administrative management. This role is exercised through senior administrative personnel, who are functionally responsible to him, in the divisions. The senior financial officer's role also includes establishing an overall system of efficient internal control, developing a code of accounts which satisfies both central agency and departmental requirements, satisfying financial reporting needs of departmental personnel, and providing advice to financial expenditure officers with respect to the monitoring and controlling of their expenditures.

FINANCIAL PLANNING DIVISION

The Financial Planning Division is responsible for the co-ordination of the budget process, space requirements, subsidized housing requirements, processing of insurance claims, acquisition proposal administration, records management, and of mail, courier and duplicating services.

BUDGETS AND FORECAST BRANCH

The branch is responsible for monitoring of the Departmental General Revenue and Alberta Heritage Savings Trust Fund Budgets. The department also participates in the Summer Temporary Employment Program (STEP) and during the winter months in the Priority Employment Program (PEP). Funds for these programs are provided by Advanced Education and Manpower. The Budgets and Forecast Branch had responsibility in the 1981-82 fiscal year for compiling a 1982-83 budget exceeding $394 million. The 1982-83 Alberta Heritage Savings Trust Fund Budget for $83,093,100 and the 1982-83 General Revenue Departmental Budget for $297,490,544 were prepared.

The branch also liaises with Alberta Housing and Public Works in providing for departmental space needs and with the Risk Management and Insurance Division of Alberta Treasury in insurance matters.

OFFICE SUPPORT SERVICES BRANCH

This branch provides the department with a wide variety of supportive services and office materials, including central duplicating services, a courier system, building maintenance and security, telecommunications, furniture and photocopy equipment.

Services are provided to the department through central office locations in Edmonton and regional offices in Calgary and Lethbridge.

Office Support Services is the department's point of liaison with Alberta Housing and Public Works for furniture acquisitions, telecommunications, and physical building renovations. The branch also works with Alberta Government Services in the areas of building maintenance and security, moving and replacing of furniture, and requirements for electrical, carpentry, and general labor services. The branch's courier service handles pick-ups and deliveries within the city and, when required, can be reached by mobile radio for emergency pick-ups.

In December, 1981, a new Departmental Telephone Directory was released by Office Support Services, listing department locations throughout the province, as well as departmental executive, management, and administrative personnel.

More than 250 telecommunications and maintenance requests were processed for the department through Alberta Housing and Public Works and Alberta Government Services. More than 2,100 pieces of new furniture were ordered for the department, including a quantity of replacement furniture.

The Central Duplicating Section acquired some new equipment which will

improve the variety and quality of service available to the department.

RECORDS MANAGEMENT BRANCH

Records Management undertook various major projects to reduce the paper handling and storage problems within the department. The major focus of activities was in the identification, organization and transfer or destruction of records in storage. This activity significantly reduced the volume of records stored within the department.

A new micrographics system was introduced for the Planning Division and for Irrigation Headworks Branch. Microfilm services were also acquired for the Land Reclamation, Water Resources, Pollution Control and Standards and Approvals Divisions.

Several file system reviews were initiated within the department and a file system conversion was completed in the Financial Operations Division.

An inventory of departmental records holdings began during the year. This inventory will serve as a basis for developing a departmental records management program plan and modifications for individual records-keeping units.

FINANCIAL OPERATIONS DIVISION

The Financial Operations Division was created as part of the reorganization of the former Finance and Office Support Division. Reorganization was prompted by the need to ensure maximum effective management of financial operations in various departmental programs.

In its support role, the Financial Operations Division assists program managers in achieving their program objectives by providing them with financial advice and guidance.

The division is organized into three branches: Accounting, Financial Advisory and Fixed Assets.

ACCOUNTING BRANCH

The Accounting Branch plans, develops, implements and maintains operational procedures to ensure that accounting operations relating to accounts payable, revenue and receivables, are in accordance with the requirements of the Financial Administration Act and applicable government policies and regulations.

FINANCIAL ADVISORY BRANCH

The Financial Advisory Branch is responsible for ensuring that financial and accounting procedures are properly applied. The branch also makes recommendations for and implements improvements to departmental administrative and financial systems.

FIXED ASSETS BRANCH

The Fixed Assets Branch implements and maintains a departmental fixed-asset control system with the primary objective of protecting public property. The system also assists management in the efficient utilization of fixed assets.

SYSTEMS AND COMPUTING DIVISION

The Systems and Computing Division supports departmental line programs by developing computer programs to process data and perform scientific calculations for day-to-day operations and for project studies. Computing facilities are provided, and line staff is trained to use the equipment and computer programs.

Consulting help is provided when problems arise and changes are made when required to keep systems current. The division co-ordinates the data processing activities of the department with the Information Services Division of Alberta Government Services and with other agencies contracted to provide systems services.

Current Applications: Twenty-two data systems and more than 40 scientific computer programs are maintained in support of 180 users in the department. Air quality, water quality, hydrometric, climatological and groundwater data systems are supported which in turn support monitoring, assessment and regulatory activities of the department. Routine collection of data on water levels, precipitation and water quality by the department's mini-computer is also supported. A number of technical/engineering computer programs which simulate various hydraulic, hydrometric and atmospheric phenomena are maintained and used by department staff to delineate river flood plains, forecast river flows and predict pollutant concentrations.

Computer programs for statistical analyses, for preparing graphs and for tabulating data are maintained to help technical staff assemble reports. Support in the compilation and editing of textual material continued, as did training for 27 clerical staff members who use more than 20 word processing work stations throughout the department.

New Applications: A number of projects were completed during the year. Head gate controls were automated on the Oldman River irrigation diversion at the Peigan site, and data collection from seismic monitors in the Cold Lake area was computerized. The division assisted South Saskatchewan River Basin planners by providing data-preparation capabilities and graphic displays used for water-balance studies.

Reporting capabilities were enhanced within the department's inventory system and contracts administration system. Enhancements to the department's data acquisition system continued.

New facilities support canal improvement activities in Lethbridge, and an image processing system was installed for the Remote Sensing Centre. New terminal facilities were installed in the Grande Prairie regional office and new facilities for Alberta Environmental Centre were ordered.

Several new models and engineering programs were implemented for the department. Computerized systems for the department's library and for groundwater data-collection were modified to provide computer-output microfilm. A metric version of the hydrometric data was also installed.

Further developments included procurement of a system for handling information on

azardous wastes and an indexing system for ngineering drawings maintained by the epartment. A system for recording departental interests in Crown lands was also eveloped in co-ordination with Alberta nergy and Natural Resources. A study of he department's word processing needs was nitiated. Support continued for activiies relating to land parcels in Fish Creek rovincial Park.

Co-ordination and Planning: Data and ystem technology transfers continued etween the department and Environment anada. These exchanges involved water quality, air-monitoring and hydrometric data. The department has access to Canada Land Inventory data, to indexes of available satellite and air photo imagery, to data about municipal water and wastewater treatment facilities and to information about hazardous waste. This information is available via computer terminals using federal agency systems. The division continued to promote the use of system development standards and has also reorganized into more specialized functions to provide better services to the department.

PUBLIC COMMUNICATIONS DIVISION

The communications function within the department was assisted by a reorganization of the former Communications Branch into the Public Communications Division. The new division was structured into three branches, with support staff to provide media and production services, to improve the environmental education program and to provide public relations and communications counselling to the department. Communications plans were prepared for some divisions, as well as for specific programs.

The department's bimonthly magazine, Environment Views, continued to examine current environmental issues and included researched articles on land reclamation, groundwater, noise pollution, regional issues, the human side of energy, and acid rain. A 50 per cent increase in demand brought total circulation to about 12,000. Teachers' guides were prepared to encourage use of the magazine as supplementary social studies material in the high schools.

To familiarize the department with the division and its services, a four-part series of briefings was designed. The first, Communications Division -- who, what, why, where, when and how, was held for senior management. Subsequent sessions were scheduled to cover media relations, the educational program and the production of Environment Views magazine.

Again there was considerable involvement with public participation programs -- the Slave River Feasibility Study (final stage) and Special Wastes. An overall increase was noted in news releases, media contacts, and general and educational inquiries.

ENVIRONMENTAL EDUCATION RESOURCES BRANCH

The environmental education program operated by the Environmental Education Resources Branch continued to expand its services to the educational community and the public, assisting these two groups in developing a deeper understanding of environmental concerns.

The number of environmental education workshops and seminars was increased for teachers wanting to improve their environmental instruction skills. Five trained educational consultants, two contracted on an annual basis and three on a per-workshop basis, assisted the environmental co-ordinator in conducting workshops.

Eighty-five workshops were completed during the 1981-82 academic year. The branch was unable to fill an additional 12 requests for workshops because of the high demand. Three thousand inquiries from educators and/or educational institutions were answered.

Learning units produced or updated included Winter Here and Now, a book written by an Alberta educator, and Green Plants, a major unit restructured into more manageable segments. The final draft of the Rodeo unit was prepared. Two posters, entitled Recycling and Why Recycle?, were purchased in quantity and distributed to schools and the public.

The branch also did preliminary work on he Educating for Environmental Action rogram.

RODUCTION AND MEDIA SERVICES BRANCH EDMONTON)

The Production and Media Services ranch (Edmonton) is responsible for ssessing the communications needs of epartment programs and for planning and roducing the necessary materials.

The two public affairs officers in this ranch write, edit and co-ordinate the rinting of brochures and other published aterials; arrange for production of udio-visual aids such as posters, displays, igns and films; write and place advertising nd assist with special events.

They also write and distribute news eleases, respond to inquiries from the edia and arrange press conferences.

A new position of production clerk was created to assist with the growing volume of print/graphic orders.

During the reporting period, branch staff handled about 210 orders for print/graphic materials, audio-visuals and advertising. They issued 63 news releases and received 92 inquiries from the media.

Assistance with planning, multi-media production and media relations was given to the following programs: the Eurasian Water Milfoil public awareness program; Lake Wabamun Eutrophication Study; pesticide container collection and disposal; used lubricating oil recycling; Dickson Dam; Paddle River dam; land reclamation; Cold Lake-Beaver River water management study; hazardous wastes and South Saskatchewan River basin planning.

PRODUCTION AND MEDIA SERVICES BRANCH (VEGREVILLE)

This branch was activated with the hiring of a public affairs officer assigned to the Alberta Environmental Centre. Major activities centred around developing new communications programs for internal, technical and other audiences and continuing a community relations program.

One major project was the development of a format for a Centre annual review. At the fiscal year's end, the review was nearing the production stage. The branch also began producing a staff newsletter and drew up plans for a newsletter for external audiences. An active community relations program was pursued, designed to ease relocation of new employees to Vegreville, and to develop understanding and co-operation between the Centre and the town.

The branch began meeting the Centre's printing and media liaison needs, handling 41 printing jobs and 25 media inquiries. Five press releases were issued to local newspapers. An estimated 120 tours were conducted for local groups, visiting dignitaries and schools.

The Communications Division was also active in preparing the official opening of the Environmental Centre on June 12, 1981.

CONTRACT ADMINISTRATION

Contract Administration personnel assist in the preparation of contracts proposed by the divisions, review and approve contracts originating in the department and process for payment all accounts related to contracts.

The following is a summary of the volume and accumulative dollar value of contracts processed:

	Volume	Value
1977-78	624	$ 23.8 million
1978-79	1,000	$ 31.8 million
1979-80	928	$ 94 million
1980-81	932	$300 million
1981-82	1,092	$281.8 million

Of the 1,092 contracts, 20 were major tendered construction contracts amounting to $76.5 million; 119 pertained to water and sewage works assistance grants in the amount of $177 million; and three related to the regional utilities program amounting to $10.9 million.

The above dollar values do not indicate the amount paid during the fiscal year since some contracts extended over a period of more than one year and in other cases modifications introduced as work progressed may have reduced or increased the amount actually paid. This is particularly applicable in the cases of the water and sewage works grants and the regional utilities grants where the final amount paid is dependent upon construction costs and the community population count at the completion of construction.

Approximately 4,000 contract invoices were processed during the 1981-82 year.

The computer program which provides information to assist the divisions in contract management was further expanded to produce information on the number of days required to process each contract invoice through the department.

The refining and updating of standard contract documents continued, as did the entering of these documents into a word processing program.

Assistance was provided to divisions in the department in the development of a number of contracts or general agreements pertaining to water and sewage works assistance grants, the regional utilities program, and the program for the rehabilitation or development of water supply works for irrigation districts.

A seminar on contract administration was presented to regional office managers in the Alberta Forest Service.

ENVIRONMENTAL PROTECTION SERVICES

E. E. Kupchanko, P.Eng.
Assistant Deputy Minister

R. N. Briggs, P.Eng.
Director
Pollution Control Division

John Defir, P.Eng.
Director
Standards and Approvals Division

L. D. Sadler, P.Ag., P.Eng.
Director
Earth Sciences Division

J. Shah, Ph.D.
Director
Research Management Division

The role of the service is to prevent or control pollution, and to encourage research into applied solutions for environmental problems.

A major part of the program involves the setting of standards which govern the maximum amount of contamination permitted to enter the environment from most man-made sources.

Another key part of the program is the monitoring of the environment -- principally the air, water, wastes, and pesticides -- to ensure the standards are being followed and, where necessary, to enforce compliance with the standards for control of pesticide chemicals and solid (municipal and industrial) waste disposal.

The research activities focus on finding solutions which are directly applicable to a wide range of environmental problems, including those related to human interactions as well as to man's impact on the natural biological and physical systems.

The service administers grants to assist communities in developing adequate water supplies and sewage treatment facilities.

POLLUTION CONTROL DIVISION

The Pollution Control Division enforces various legislation -- The Clean Water Act, The Clean Air Act, The Agricultural Chemicals Act, The Hazardous Chemicals Act, The Litter Act, The Beverage Container Act and their respective regulations -- to achieve safe and publicly-acceptable levels of environmental quality.

AIR QUALITY CONTROL BRANCH

The purpose of the Air Quality Control Branch is to achieve air quality which is within established standards.

The branch enforces the regulations under The Clean Air Act, the terms of air quality licences and approvals, and is responsible for the general monitoring of the air environment. It maintains an extensive air quality monitoring network and has an intensive program for sampling effluents from stationary sources. Industry is required to monitor its operations and the branch reviews and verifies these results.

One emission control order was issued for violation of The Clean Air Act and three offenders of the act were prosecuted.

In 1981, the branch continued to receive and investigate complaints as follows:

TABLE 3

Number of Complaints Handled in 1981

Type	Edmonton Urban Area	Calgary Urban Area	Northern Rural Area	Southern Rural Area
Odor	188	62	62	27
Dust	31	30	17	28
Smoke	38	61	36	22
Noise	14	1	7	1
Misc.	8	8	3	6
TOTAL	279	162	125	84
Percent Resolved*	39.4	48.1	45.6	63.1

*NOTE: The remainder of complaints are either pending, were not able to be verified or were referred to the appropriate authority or agency.

The number of complaints received by the branch in 1981 represents an increase of 13.2 per cent from 1980.

Urban Air-Quality Monitoring: The air-monitoring network for Edmonton and Calgary consists of 57 total sulphation stations, 61 dustfall stations, six hydrogen sulphide stations, four fluoride stations, six soiling index analyzers and six high-volume samplers.

In total, nine comprehensive continuous air-monitoring stations were operational. Each of these stations had instrumentation for the detection of carbon monoxide, ozone, oxides of nitrogen, nitrogen dioxide, sulphur dioxide and total hydrocarbons. Four

of the stations are based in Edmonton, four in Calgary and one station is used for monitoring the other major urban areas. An air quality index (IQUA), based on the most significant air pollutants (nitrogen dioxide, carbon monoxide, total oxidants, sulphur dioxide and smoke) in Edmonton and Calgary, was released daily to the media and general public.

The monitoring network for smaller urban centres consists of seven high-volume samplers, 29 total sulphation, 23 hydrogen sulphide, and 18 total dustfall exposure cylinder stations. A comprehensive survey was carried out in Medicine Hat and Fort Saskatchewan.

Rural Industrial Air-Quality Monitoring: The branch operated four mobile laboratories in the Red Deer, Whitecourt, Calgary and Edmonton areas. The laboratories continuously monitor sulphur dioxide, hydrogen sulphide, wind speed and direction. Special air-quality monitoring surveys were conducted in the Crossfield, Joffre, Nevis and Sturgeon Lake South areas.

A network of 31 total dustfall, 179 hydrogen sulphide, 179 total sulphation and eight fluoride exposure cylinder stations was maintained near rural industrial operations.

Monthly precipitation samples were collected and analyzed at six locations -- Suffield, Calgary, Red Deer, Edmonton, Whitecourt and Beaverlodge -- to help in the assessment of acid rain impact in Alberta.

Industry Compliance Review: The branch received monthly and annual reports from major industries such as those dealing with fertilizer, petroleum, gas processing, pulp and paper, meat packing, thermal power, steel, rendering, chemicals, plastics, cement and wood products. The branch checked the reports for compliance with licence and approval requirements, and investigated cases of noncompliance. The amount of data handled is summarized as follows:

TABLE 4

Reports Reviewed as Required by Clean Air Licences

	1977	1978	1979	1980	1981
Monthly reports required to be submitted as per licence	2,399	2,612	2,832	3,043	3,182
Annual reports required to be submitted as per licence	214	222	231	246	276

Air Pollution Source Monitoring: In 1981, 84 sampling tests were conducted on 28 stacks at 14 plants to assess the air contaminant emission rates from stationary sources and to check compliance with approved limits. A gas chromatograph for on-site source sampling was used for the measurement of vinyl chloride monomer and is being tested for Total Reduced Sulphur (TRS) emission measurement.

Source emission surveys conducted by various industries were reviewed for compliance to emission limits and for acceptability of the industry's stack sampling technique. In addition, the branch witnessed about 60 source emission surveys conducted by industry or consultants.

Meteorology: The Edmonton air pollution meteorological station (rural) continued to gather wind, temperature stratification and turbulence data. Four minisondes were released each weekday during the mid-season months to determine complete boundary layer profiles of wind and temperature. Inversion heights were monitored continuously with a SODAR (sound detection and ranging) unit.

Other Activities: In September 1981, a special monitoring survey was conducted for the identification of trace atmospheric contaminants in the vicinity of various industries throughout Alberta. Two monitoring and analytical systems were used: one being the Sciex TAGA 3000 (TM) operated by Sciex Inc., and the second being adsorption on tubes with subsequent analysis with a gas chromatograph/mass spec system as conducted by the University of Calgary.

The Air Quality Control Branch ordered a self-contained, self-powered mobile air-monitoring laboratory. This unit will be capable of carrying out continuous air-pollution measurements while in a mobile mode and responding quickly to emergency situations.

The branch continued its support of a dry sulphur deposition measurement project. The three-year project, in its second year during 1981-82, is carrying out field studies related to sulphur dioxide concentration gradients and the test of eddy accumulation methods.

The nitrogen dioxide compressor exhaust chemistry and wake diffusion study resulted in an annotated bibliography and a new compressor station model.

Related to the continuing work on potential acid rain impact, a Frequency Distribution Model for ground-level pollutant concentrations was finalized. Sulphur deposition maps were prepared for several regions of the province, and the first draft was completed of a report dealing with various aspects of precipitation chemistry and precipitation data quality assurance.

WATER QUALITY CONTROL BRANCH

The branch's main function is to maintain or improve surface water quality through enforcement of The Clean Water Act and regulations dealing with industrial wastewater effluent standards. Branch activities included inspections and surveillance of industrial wastewater systems, the monitoring of stream and lake quality, investigation and resolution of problems associated with complaints and spills, and participation in environmental

public-education and public-awareness programs.

Industrial Monitoring: Industrial process reviews were conducted at 24 plants for the purpose of improving wastewater quality. These reviews involved the evaluation of waste-treatment facilities and an assessment of effluent quality to ensure compliance with licence requirements.

Special attention was directed to gas processing plants' storm runoff water, flow measurement assurance, and data storage systems during the year.

Stream Monitoring: The South Saskatchewan River Basin Eutrophication Control Study was the focus of the branch's stream monitoring program. Biological and water-chemistry data were acquired to better define the present state of the basin water prior to commencement of phosphorus removal at Calgary. Other streams monitored for water quality were Beaver River, Surmont Creek, Little Bow River and Lee Creek.

Lake Monitoring: Intensive monitoring of Lake Wabamun and the eight lakes in the lakeland area of east-central Alberta continued in 1981-82. Gregoire Lake was added to the list of lakes under close scrutiny by the branch.

Branch activities for the Lake Wabamun Study included the installation and evaluation of an artificial enclosure to provide some insight into consequences of water-quality manipulation.

Lake monitoring is used as the basis for the determination of the trophic "status" of a lake. After its status is understood, water-resources management plans can be properly designed for a basin.

Complaints and Spills: The branch, committed to the Pollution Emergency Response Team, responded to spills of acid, gasoline, sulphur, potash, asphalt and other chemicals. Clean-ups of spills affecting surface or groundwater were supervised by branch personnel. Complaints relating to ground or surface water pollution were investigated and, where problems could be verified, resolutions were found. During the year, 113 investigations were made.

Public Relations/Education: Branch staff participated in 30 environmental seminars and workshops. Scientific papers were presented at conferences. Lectures were presented to students at high school and post secondary levels.

A project to include biological monitoring of Alberta streams in the province's high school biology curriculum was well received by the students. This educational program gave students a hands-on experience in applying theory.

UNICIPAL ENGINEERING BRANCH

The branch's primary responsibilities re to enforce The Clean Water Act and egulations which apply to municipal water nd sewage systems and to implement the egional Utilities Program. Other branch ctivities include the monitoring of munici-al water and sewage systems, investigation f complaints, implementation of projects of nterest to the province, and training and ducation of municipal water and sewage system operators. The branch is divided into three sections: the Field Services, Regional Utilities, and Operator Training and Certification Sections.

Field Services Section: This section is responsible for routine monitoring, surveillance and enforcement activities of the branch. These activities are carried out through the main office in Edmonton and regional offices at Grande Prairie, Lethbridge and Red Deer. Table 5 indicates the general level of activity for this section in comparison to previous years.

TABLE 5

	1979-80	1980-81	1981-82
Inspections	750	850	650
Complaint Investigations	25	12	40
Composite Sampling	33	32	53
Communities Inspected	330	360	310
Private Facilities Inspected	48	92	50

The field sampling program remaincd at reduced levels due to a lack of departmental analytical support services. Commercial laboratories were used; however, there were difficulties in comparing results from the different labs. Other major field monitoring activities included:

-- a treated water survey;
-- a sewage split sampling program at Edmonton, Calgary, Red Deer and Lethbridge;
-- completion of the ion exchange pilot plant testing program at Elnora, Consort and Youngstown;
-- continuation of the screening of potable water using biological/chemical techniques; and
-- monitoring the water quality of several storm water ponds in the Calgary area.

In addition, the section produced annual surveys of facilities, fluoridation, water quality and bacteriological quality. Considerable time was spent in processing past information and data for computer storage, retrieval and future report generation.

The harshness of the 1981-82 winter resulted in a number of emergency water-supply situations. Extensive freezing resulted in major water shortages at Granum, Claresholm, and Grouard. A number of other communities were affected to lesser extent with frozen or broken lines or frozen systems. Field Services staff members assisted the communities in providing temporary solutions.

In its activities related to the Northern Water Supply program, the Field Services Section directed considerable attention to inspection and follow-up to ensure the six water plants were upgraded and repaired. Negotiations commenced for the transfer of ownership and operational responsibilities of the surface water

treatment plants at Paddle Prairie, Little Buffalo, Loon Lake, Gift Lake, Calling Lake, and Wabasca to the appropriate local authorities.

Regional Utilities Section: Responsible for evaluation and implementation of the Regional Water and Sewage Program, the section was active in the Edmonton, Calgary, Cold Lake-Grand Centre, Crowsnest Pass and Red Deer areas.

In the Edmonton area, preliminary design was completed for Phase III of the South East Regional Sewage System, and Phase I of the Parkland Sewage Line and the North East Regional Sewage Line.

Tenders were called for blowers and air diffusers for the Regional Sewage Treatment Plant. Detail design was being finalized on the remaining plant components.

Eighty per cent of construction for Phase II of the river crossing for the South East Regional Sewage System was completed. Sixty-five per cent of the construction for the Vegreville Regional Water Line and 35 per cent of the reservoir and pumphouse construction were completed.

In the Calgary area, funds were provided for the Airdrie water and sewage lines. Discussions were held with a number of local officials about implementation of the Calgary Regional Utility Study recommendations.

The department commenced a water and sewage study for the Crowsnest Pass area.

Discussions were held with the City of Red Deer, County of Red Deer and the Town of Penhold about regional sewage servicing.

Preparation of the Regional Utilities Act legislation was transferred to Alberta Municipal Affairs.

Further funds were provided for the Parkland, Morinville, North East and Airdrie water lines and the Airdrie Sewage Line.

Total Regional Water and Sewage Program expenditures for the fiscal year ending March 31, 1982, were $31,636,178.

Operator Training and Certification Section: The section is responsible for the development and delivery of operator training and certification programs.

A training program for municipal water and wastewater operators was continued during the year. Fifteen short courses, one home study course and two correspondence courses were offered by the branch. Approximately 200 municipal operators took part in the program. The section also supported training courses sponsored by other agencies such as the Western Canada Water and Sewage Conference.

Negotiations were commenced with Alberta Advanced Education and Manpower and the new technical/trades institute to be built in Stony Plain with respect to technology courses for water and wastewater operators.

A voluntary restricted certification program was continued. Fifty-six new certificates were issued to make a total of 247 certified water and wastewater operators in Alberta.

Changes to The Clean Water Act (Municipal Plant) Regulations were approved to make it mandatory for water and wastewater treatment plants to be operated by certified personnel. Guidelines were under preparation for implementation and administration of a certification program.

PESTICIDE CHEMICALS BRANCH

The branch has responsibilities in three broad areas:

-- Licensing, Training and Enforcement: administration of The Agricultural Chemicals Act and the co-ordination and development of pesticide management-training programs;
-- Inspection and Monitoring: inspection of spraying sites, records, equipment and storage facilities. Aquatic and terrestrial systems are monitored to determine the presence and impact of pesticide chemicals.
-- Biting Fly Abatement: administration, co-ordination and supervision of the Municipal Biting Fly Control Financial Assistance Program.

Licensing, Training and Enforcement: The branch licensed 600 pesticide applicators and 61 pesticide vendors, and appointed eight inspectors under The Agricultural Chemicals Act. The branch issued 173 special permits for the application of restricted or experimental pesticides. Most of these permits were for the use of chemicals on or near water or in the Green Area of the Province.

One hundred and sixty-seven complaints were investigated and three charges were laid under The Agricultural Chemicals Act.

A total of 761 persons received training in pesticides through courses held at Lethbridge, Calgary, Olds, Stettler, Red Deer, Edmonton, Smoky Lake and Fairview. Correspondence courses from Lakeland College were completed by 63 persons.

Inspection and Monitoring: During the year, 3,024 inspections of storage facilities, pesticide vendors' premises, transport facilities, permit sites, and spray operations were conducted. Inventory records of the larger storage facilities are maintained for emergency purposes. Residues were monitored at several sites of spills, accidents and major fires. A monitoring study was conducted in co-operation with Alberta Agriculture to determine the persistence of soil-active herbicides along roadsides.

Biting Fly Abatement: A total of 31 municipalities participated in the Biting Fly Control Financial Assistance Program during 1981. Departmental grants totalling $572,708 were provided for this program.

Continued support of research projects related to biting fly biology and taxonomy, and abatement methodologies was provided by the branch. Study contracts totalling $47,369 were processed during 1981.

An ongoing monitoring program was conducted to determine the toxicity of various pesticides currently employed in mosquito control operations. Three studies were initiated by branch and contract personnel. One study assessed the potential for biological control of mosquitoes using parasites and predators native to Alberta. The second determined factors contributing to the occurrence of large mosquito populations in conjunction with irrigation. The

hird study screened larvicides for the retreatment of mosquito developmental ites. Continuous monitoring of abatement rograms is essential to ensure that more nvironmentally-acceptable methods are being mplemented wherever possible.

Branch staff provided information and echnical assistance for abatement programs means of bulletins, visits, seminars and aining courses on the safety, management d control of pesticide chemicals and the ology of mosquitoes.

Special Programs: A pesticide-ntainer collection program was initiated co-operation with rural municipalities d local health authorities. Grants were ovided to the municipalities by the partment for the construction of 26 perma-nt collection sites. A total of 339,615 ntainers was collected across the province ring the year. The majority of these ntainers was recycled at a steel mill.

The Alberta Eurasian Water Milfoil ogram was initiated to prevent the spread this water weed into Alberta waterways. e program consisted of a public awareness mpaign (posters, brochures, radio adver-sements and news media packages). Seven-en lakes and reservoirs were monitored for e water weed.

Publications: A monthly publication, date, was mailed to 1,800 subscribers. ur fact sheets with information on sticides were published and distributed. o issues of the Pesticide Chemicals anch's semi-annual publication, Pesticides Focus, were distributed to 150 technical d professional people. An Identification ide to Alberta Aquatic Plants was blished to assist vegetation managers in uatic plant identification.

Branch personnel provided representa-on on provincial, federal and inter-partmental committees dealing with the use d disposal of chemical compounds, research iorities and the environmental impact of atement programs.

STE MANAGEMENT BRANCH

The Waste Management Branch is involved the management of industrial and zardous wastes and the reduction of waste rough resource recovery. The branch inisters The Hazardous Chemicals Act, The verage Container Act and The Litter Act.

Hazardous Waste Management: Hazardous ste generation and disposal continues to a major environmental problem in Alberta. forts at developing a policy and action rategy advanced in 1981-82 with the work of the branch in conjunction with the Hazardous Waste Implementation Team. Development of criteria for facility siting, technology review and assessment, and management options led to the release of a policy statement by the government in January, 1982. Legislation on hazardous waste management and for the establishment of a Crown Agency on hazardous waste was introduced in the spring session of the legislature.

The branch continues to provide technical and financial assistance to municipalities for advanced waste management. In 1981-82, grants were made to the Municipal District of Foothills (High River, Okotoks, Turner Valley), County of Lamont (Bruderheim, Lamont, Chipman), County of Lacombe (Lacombe, Blackfalds, Mirror), Drayton Valley, and Canmore. As a result of the program more than 30 open burning dumps were closed.

The branch also provides information and advice on the safe handling and disposal of hazardous wastes and ensures proper containment and clean-up of chemical spills. Advice is given regarding the restoration of the affected sites.

Resource Recovery: The branch encourages and promotes recycling of waste materials by providing information and technology to industry, municipalities and the public. Grants are available to non-profit groups and municipalities for recycling equipment such as bins for the collection of glass or paper and used-oil collection tanks.

A major aspect of resource recovery is the administration of The Beverage Container Act and the Alberta container depot system. In 1981-82, 178 licensed depots were operating in Alberta for the return of soft drink bottles and cans, liquor and wine bottles and juice cans. Glass, metal and plastic containers returned to depots are recycled into other useful products.

Used-oil recycling advanced in 1981-82 with the installation of five collection tanks at municipal landfill sites.

Litter Control: The branch is responsible for the administration and enforcement of The Litter Act. This act allows police and local enforcement officers to issue tickets for littering offences and clean-up orders for unsightly premises. The branch also works with and financially supports Outdoors Unlittered Inc., a non-profit organization engaged in anti-litter campaigns and educational programs.

STANDARDS AND APPROVALS DIVISION

The Standards and Approvals Division processes applications by industries and municipalities for permits to construct and licences to operate their facilities under The Clean Air Act and The Clean Water Act. In addition, the division is responsible for the management and administration of the Alberta Municipal Water Supply and Sewage Treatment Grant Program.

The standards imposed in the approval of proposed facilities reflect currently-available technology, with due regard for balancing the cost expended in achieving the standard and the benefit from the environmental protection to be realized.

Extensive effort was directed, during the year, to amending current legislation and to the development of new proposed statutes and guidelines.

AIR QUALITY BRANCH

The prime responsibility and objectives of the Air Quality Branch are to achieve and maintain acceptable ambient air quality through the use of regulations, guidelines and policies applied to industrial and other operations.

To ensure that acceptable air pollution control systems were being applied, much time was spent assessing air-quality impact from new industrial developments and for expansion phases of existing facilities.

A total of 188 permits and 576 licences were issued under The Clean Air Act during the year (see Table 6).

Staff participated extensively in Energy Resources Conservation Board hearings. In addition, the branch was active on several committees dealing with acid rain. The branch continued its participation on the National Air Quality Objectives Sub-Committee, contributing to the development of guidelines and information programs.

Assistance and input were provided in the preparation of amendments to The Clean Air Act. Three major changes were made to the legislation: 1) increasing penalties for various offences; 2) allowing the Director, Standards and Approvals Division, on his/her own initiative, to amend a licence with respect to monitoring requirements; and 3) admitting as prima facie evidence the facts stated in various documents without proof of the signature or official character of the person signing the document. The documents referred to include:

(a) a certificate of variance or stop order purporting to have been signed by the Minister of Environment;
(b) an order, permit, licence or approval purporting to have been signed by the Director, Standards and Approvals; or
(c) an order or approval purporting to have been signed by the Director, Pollution Control Division.

WATER QUALITY BRANCH

Petrochemical, forestry, coal-mining and gas-processing projects continued to be the major industrial sectors requiring water-quality impact assessments by branch staff. Water-quality guidelines were

TABLE 6

Air Quality
Permits and Licences

Category	Permits	Licences
Agricultural Activities Including Meat-Processing Plants	18	73
Anhydrous Ammonia Storage Facilities	17	15
Asphalt Plants	4	17
Chemical Plants	7	10
Compressor Stations	32	80
Experimental In-situ Oil Sands Operations	20	22
Fertilizer Plants	4	0
Gas-Processing Plants	48	83
Incinerators	7	228
Oil Refinery Operations	9	4
Power Plants	3	1
Others	19	43
Total:	188	576

prescribed for energy-related industries requiring industrial-development permits and reclamation approval.

Other major branch activities included:

- preliminary assessment of effluent color-reduction technology and its impact on a river basin for an existing bleached kraft pulp mill;
- reviewing the wastewater management aspects of treating acidic runoff waters from sulphur block storage areas at gas-processing plants; and
- completing and preparing for publication a revised edition of waste-management guidelines for agricultural practices.

The branch continued to supply water-quality information. It also continued to participate in Energy Resources Conservation Board hearings in the role of examiner.

A total of 124 permits and 162 licences were issued for the construction and operation of industrial facilities (see Table 7). Nine letters of permission were also issued, authorizing the temporary release of liquid effluents under controlled conditions. Fourteen projects were exempted from having to obtain environmental water permits and licences.

Ninety-four new applications for certificates of compliance were received for large livestock operations in the southern part of the province. Forty-nine certificates were issued from these applications. Fifty certificates were issued from 55 applications received in the province's northern region.

TABLE 7

Water Quality
Permits and Licences

Category	Permits	Licences
Asphalt Plants	5	13
Chemical Plants	2	7
Coal Processing	1	1
Concrete & Cement	0	1
Fertilizer	3	0
Food Processors	1	1
Gas Plants	52	79
Meat Packing and Processing Plants	1	3
Oil Sands Plants and Experimental In-situ	5	5
Petroleum Refineries	23	29
Power Plants	2	0
Sand and Gravel Washing Plants	9	15
Wood Processing	2	1
Miscellaneous Facilities	18	7
Total:	124	162

Branch staff assisted in the preparation of amendments to The Clean Water Act. Staff members also participated on committees assessing intra-provincial surface water quality.

Additional support was provided for the environmental component of major energy development hearings and for the administration of national and provincial water pollution control regulations.

Regional planning commissions and municipal governments continued to be informed of technical matters relating to environmental control programs for large feedlots.

MUNICIPAL ENGINEERING BRANCH

The major responsibility of the Municipal Engineering Branch is to establish and implement safe and publicly-acceptable standards for municipal water supplies and wastewater disposal systems. This public service is achieved by establishing appropriate design and treatment criteria and by reviewing and approving all municipal water and sewage projects. Further involvement in, and control of, these vital services is exercised through the judicious application of financial assistance programs.

A total of 406 permits for the construction of municipal water and sewage

facilities were issued during the year. This represents about a 15 per cent decrease from the previous year. The decrease is the result, primarily, of a downturn in the number of subdivision-servicing projects approved. Also during the year, 22 amended permits were issued and 36 cost-increase changes processed.

Total estimated cost of approved water and sewage projects increased by about nine per cent over the previous year. Historical data relating to the issuance of permits is shown in Table 8.

During the year, 135 certificates of compliance were issued to signify satisfactory fulfillment of conditions attached to permits to construct. Eleven letters of permission were also granted, primarily for regulating the application of sludge to agricultural land.

All municipal water supply and sewage treatment facilities were reviewed for adequacy early in the year. Priorities for improvement and upgrading were established. Involved municipalities were contacted to initiate the required works. As a result, the goal of secondary sewage treatment for all municipalities has almost been reached. The main emphasis now is on keeping pace with the rapid urban development in some parts of the province.

The Licence to Operate program for municipal facilities continued with 70 licences issued during the year. These licences detail the operating parameters and reporting requirements for water and sewage treatment facilities.

Legislation enforcement was undertaken as required. For example, failure of a developer to comply with an order to properly install a water facility resulted in legal action being taken by the department in the form of an order to construct.

Alternative or innovative sewage treatment methods were reviewed and evaluated, with appropriate implementation policies developed where applicable. Detailed guidelines were developed for the application of sewage sludge to agricultural lands. The branch was also involved in the development of national guidelines on wastewater disinfection. Other work included a compilation of data on phosphorus discharges from municipal sewage treatment plants; an investigation of sludge injection techniques; and a review of thermophilic sludge digestion.

In the waterworks field, several detailed investigations were undertaken: the World Health Organization's draft drinking-water guidelines were assessed; guidelines were written on communal water-supply systems for small developments; an evaluation of the use of chlorine dioxide for water disinfection was prepared; and a report was completed on giardiasis, a water-borne parasitic infection.

The branch participated in the Alberta Urban Municipalities Association conference in Calgary, where an information area was located to handle inquiries.

As in past years, much time was spent on a number of controversial municipal projects which generated a great deal of public interest. These included the Brooks sewage lagoon leakage control project, siting of the proposed Millet sewage lagoon, and water supply for Mirror.

A review of existing legislation was continued to better meet the needs and requirements of municipalities and the department. Work began on an overall evaluation of standards and guidelines, including the development of comprehensive water and sewage facility design standards. Areas evaluated included sewage treatment design criteria and piping and lagoon fencing standards.

Management of the Alberta Water Supply and Sewage Treatment Grant Program continued to be a major activity. Demand for financial assistance again exceeded the original budget allocation. A Special Warrant increasing the amount of grant funds was passed in July, 1981.

The total budget allocation for the program was $99,543,498. From this, grant funds totalling $98,430,190 were distributed to 94 municipalities for a total of 98 eligible water and sewage projects. Historical data relating to the operation of the grant program is shown in Table 9.

In addition, a grant of $5 million was given to the City of Calgary from a separate budget allocation, to assist in the installation of phosphorus-removal facilities.

Other major activities dealing with financial assistance under the grant program included:

-- assessment of the Auditor-General's report on the management control system audit of the program;
-- the hiring of an auditor to conduct a review of procedures, including a detailed audit of several municipalities; and,
-- the hiring of a consultant to prepare a comprehensive policy and procedures manual on the program.

To compensate for cancellation of the Federal Community Services Program, major

TABLE 8

Summary of Approved
Water and Sewage Projects

Fiscal Year	Number	Estimated Cost ($ million)
1973-74	375	160
1974-75	434	180
1975-76	533	310
1976-77	666	310
1977-78	650	270
1978-79	615	350
1979-80	731	570
1980-81	480	690
1981-82	406	755

TABLE 9

Alberta Water Supply and Sewage Treatment Grant Program

Fiscal Year	No. of Municipalities Assisted	No. of Projects Initiated	Grants Paid
1979-80	94	108	$27,770,080
1980-81	104	112	$67,305,682
1981-82	94	98	$98,430,190

changes were made to the Alberta Municipal Sewage Treatment and Water Supply Program to provide extra assistance to smaller communities. Some minor changes to the municipal qualifying level and upper grant assistance limit were made.

INDUSTRIAL WASTES BRANCH

The branch participated in the department's Hazardous Wastes Management Program and co-ordinated the amendment of several environmental statutes, as well as the department's review of deep well disposal applications.

Branch staff also conducted plant inspections in Alberta on behalf of the Atomic Energy Control Board; reviewed applications for approval of industrial landfills; and trained visible emission readers for the department.

Information on acceptable disposal methods for industrial wastes was also provided to the general public upon request.

In addition, the branch investigated the latest sulphur-removal technology to determine costs for facilities being proposed for Alberta.

EARTH SCIENCES DIVISION

Programs and studies of the Earth Sciences Division relate to the major technical components of soil and groundwater protection, to the development of waste-handling systems using land for treatment or disposal, and to groundwater development. The division also administers The Ground Water Development Act.

Divisional efforts were directed to current concerns of Albertans as well as improving established programs and services.

In support of the hazardous wastes program, a large number of land parcels were subjected to geological appraisal for safe containment and treatment. Many of the land parcels did not meet stringent guidelines and were ruled unacceptable as potential disposal sites.

Groundwater contamination problems, particularly those related to leakage from underground gasoline-storage tanks, received increased attention.

A major, underground pre-glacial channel was discovered north of Cold Lake. The significance of this find will not be known for several years, but there are indications that water yields could be substantial. Other hydrogeological investigations produced groundwater inventory data throughout the province.

A program for long-term monitoring of acid deposition got under way with the establishment of two of eight planned soil-sampling sites -- one north of Fort McMurray and one at Rocky Mountain House. The program is expected to be conducted over a 50-year period, with sampling every four years on each site.

Public use of resource information, inspection services and technical help on a one-to-one basis continues to increase.

SOILS BRANCH

A major responsibility of the Soils Branch is the prevention of soil and groundwater contamination. To this end, emphasis was placed upon evaluation of potential sites for hazardous waste facilities, landfill appraisals and monitoring, regional landfill investigations, and irrigation headworks studies.

Hazardous Wastes Project: The Soils Branch has been responsible for co-ordination of the hydrogeological investigations of potential sites for a hazardous waste treatment facility in the province. The hydrogeological investigation is an important part of the environmental assessment of the potential site.

During the year, the branch completed preliminary hydrogeological office evaluations for 98 sites which encompassed a total area of about 18,500 hectares. The sites were located in the Counties of Beaver, Camrose, Flagstaff, Lamont, Ponoka, Strathcona, Thorhild; the Municipal Districts of Provost and Wainwright; Improvement District 17; and Special Areas 2, 3 and 4 east of Drumheller.

In conjunction with a groundwater consulting firm, preliminary groundwater testing was conducted on seven sites in the Counties of Beaver and Flagstaff, and the Municipal District of Provost. The

investigations included auger and rotary drilling and testing, and a detailed evaluation of hydrogeological data within an eight-kilometre radius of each site.

Landfills: The number of modified landfill site proposals continued to drop during the year, but the regional landfill concept is apparently gaining popularity. For each regional landfill developed, several modified landfills scattered throughout the region were closed and reclaimed. The evaluation of a proposed regional landfill site is more detailed than a modified landfill because of the greater potential for contamination.

Monitoring programs were established at three operating regional landfills located in the Municipal District of Sturgeon, the County of Leduc, and the County of Flagstaff. These programs will be carried on routinely for some time into the future. More sites will be monitored under the program as they become operational. Monitoring programs were also established at two municipal landfills located in Red Deer and Wetaskiwin. These programs may be taken over by the respective municipalities.

A monitoring study was completed on five reclaimed disposal sites near Bawlf, Falher, Ponoka, Stettler, and Willingdon. Further monitoring will be conducted at Ponoka. A monitoring program was also established at a reclaimed disposal site near Cardiff. Data was reviewed from Canadian National's industrial landfill near Irma and a monitoring program was established at an abandoned waste disposal site near Calgary.

Irrigation Headworks: Administered by the Lethbridge regional office, this program involves seepage control as well as shallow groundwater and reclamation studies along major irrigation canals controlled and operated by the department. During the year, investigations were initiated for two new projects on the Waterton-St. Mary's system, three on the Carseland-Bow River system, one on the Western Irrigation District's main canal and two on the Mountain View-Aetna system. Seepage investigation reports were finalized for three projects within the Waterton-St. Mary's system and one for each of the Carseland-Bow River and Mountain View- Aetna systems.

The branch continued to place high priority on studies associated with the Lethbridge Northern Headworks system where the department is committed to major upgrading and expansion. Reports documenting soil and hydrogeological conditions were finalized for two of the study sections. Intensive monitoring and report preparation continued for the remainder of the 82-kilometre system.

Country Residential Subdivisions: Applications for approval to develop country residential subdivisions are reviewed and evaluated to ensure that groundwater supplies are available and that the soil is suitable for sewage disposal.

The branch has been revising its guidelines for determining near-surface groundwater table and soil permeability characteristics. These guidelines are under revision as a result of a recent survey of regulations and guidelines for individual on-site sewage disposal systems in other provinces in Canada and states in the U.S.

Supplemental studies in support of this work included continued monitoring of groundwater levels in the Glory Hills area. Monitoring of shallow groundwater quality continued at six cottages on Wabamun Lake, to determine the potential nutrient contribution to the lake from individual on-site sewage disposal systems.

Rural Water Development: As a service to rural residents, branch staff investigated proposed sites for dugouts, small dams and spring developments. This service program is designed chiefly to determine the suitability of the soil to retain water at proposed sites, and to determine the cause of water loss from existing sites. Information is also provided to applicants on ways of minimizing or controlling water loss. Maps showing dugout-suitability ratings were completed for the Peace River region.

Dryland Salinity Studies: Dryland salinity is a serious and increasing soil-degradation problem occurring primarily in the southern part of the province. Aerial photo interpretation of two small drainage basins in the Warner area showed 6.9 per cent of the area was affected in 1978, an increase of 141 per cent from 1961 to 1978. Caused by high water tables and groundwater discharge, dryland salinity reduces productivity of the land and damages buildings, structures and utilities. Monitoring and water sampling were carried out on three pilot projects with investigational work at two sites.

Farmers in the Warner area organized an association and requested assistance from various government agencies to help in controlling the problem. The branch is represented on the Technical Workgroup for this program.

The branch also carried out a moisture-sampling project to document the effects that cultivation may have in contributing to the problem.

TABLE 10

Soils Branch
Summary of Services

Programs	1980-81	1981-82
Landfill siting:		
Evaluations	86	40
Selection	6	13
Monitoring	10	14
Regional	6	25
Groundwater contamination:		
Sewage lagoon appraisals	60	55
Rural water development (dugout tests):	194	174
Southern Alberta	144	131
Peace River	50	43
Shallow groundwater:		
Investigations	16	21
Country residential:		
Subdivision Appraisals	415	260

Shallow Groundwater Contamination: Six complaints of gasoline leaks from underground storage tanks were received and investigated. Complaints were received and clean-up operations were monitored in four other incidents of gasoline leaks. Investigation and monitoring continued at the sites of gasoline leaks in the Hamlet of Sherwood Park and in Medicine Hat.

Complaints of seepage from four municipal sewage lagoons were investigated. The branch reviewed groundwater-monitoring reports for two brine storage ponds, and construction proposals for three brine ponds. Groundwater-monitoring proposals and results were evaluated at three industrial storage pond sites, and one groundwater-rehabilitation proposal was reviewed.

TECHNICAL DEVELOPMENT BRANCH

Major branch emphasis was placed on soil acidification research and monitoring. Activities related to land treatment of wastes, reclamation of disturbed lands and analytical services were maintained. Involvement in these areas occurred in various forms, including investigation, research review, data interpretation and consultation.

Waste Utilization: Experiments on land application of municipal sewage sludge were terminated at Edmonton and Calgary, and data analysis has been proceeding. A new sludge study was initiated at Red Deer.

Guidelines drafted by the branch to govern sewage sludge application to land were published by the department.

Wastewater irrigation investigations were conducted for nine municipalities and industries. A report on wastewater irrigation of aspen was close to completion. The branch is participating in the preparation of a Manual on Land Treatment of Municipal Wastes for Canada, which is sponsored by Environment Canada. A number of physical, chemical and microbiological parameters of an operating conventional sewage lagoon were measured in detail over the seasons.

The branch participated in co-operative projects with respect to toxicity evaluations of oil well sump fluid and to oil waste treatment on land.

Reclamation: Reclamation studies continued at Bow City where various treatments are under study for their ability to improve sodic mine spoil. Stockpiled top soil was also studied for possible change in chemical, physical and microbiological properties.

A characterization and greenhouse study of fly and bottom coal ash from Wabamun, Forestburg and Grande Cache was undertaken and the results were published in the Proceedings: Workshop on Coal Ash and Reclamation 1981.

A study on the use of bottom ash as a barrier to upward salt movement from sodic spoil was near to completion. Three staff members actively participated on steering committees dealing with reclamation.

Soil Acidification: A detailed study of soil sensitivity to acid deposition was well under way. Comprehensive, long-term soil-monitoring sites were established near Fort McMurray and Rocky Mountain House in an attempt to record changes in soil chemistry over time. The branch co-operated with the Alberta Environmental Centre on a preliminary study on the effects of environmental sulphur on farm animals.

Analytical Services: Laboratory analyses of soil, water, microbiological aspects, wastes and other matters were conducted for the department, other government agencies, and private citizens. A summary of constituents is outlined below:

Material	Analysis	Constituents
Soil	chemical	127,174
Soil	physical	6,174
Water	chemical	40,029
Wastes	chemical	1,621
Plant	chemical	737
Microbiological	(samples)	400

Miscellaneous: The Canadian Industries Ltd. (Calgary works) mercury clean-up was completed. A study was completed by the Technical Development and Soils Branches to measure the salt and moisture status of cultivated and non-cultivated soils. A soils investigation was conducted on a gas plant sulphur block clean-up project. Branch staff presented a total of nine technical papers at conferences throughout North America.

GROUNDWATER BRANCH

The Groundwater Branch placed major emphasis during the year on activities for a hydrogeological inventory in the Cold Lake region, seismic monitoring in the Cold Lake oil sands area, an information service on groundwater resources, and special investigations concerned with groundwater protection. The branch also provided expertise to public and governmental agencies. Information was provided in the areas of groundwater exploration, water-well development, environmental impact assessment, and other hydrogeological and geological matters.

Hydrogeological Inventory in the Cold Lake Region: The discovery of a major, buried channel aquifer highlighted the year's hydrogeological inventory program.

For its hydrogeological inventory program, the branch compiles data from all available sources, with occasional confirmatory or exploratory drilling. From the data, several buried pre-glacial and interglacial river channels have been delineated in detail in the Cold Lake area. Their groundwater potential is evaluated by constructing observation wells. Within the Primrose Lake Air Weapons Range, a major buried channel was found and a 300 metre deep well was constructed to evaluate it.

Industry interest has been high, and two companies have already completed wells in this high-yield aquifer. The discovery was made from publicly-available oil industry well logs which are routinely evaluated for information on surface

materials in the east-central part of the province. After the new aquifer was delineated from records, its presence and potential were confirmed by construction of a deep well. Co-operation with industry in defining the underground geological framework in the Cold Lake area has been important in this project. A major new collection of data has been obtained from the Energy Resources Conservation Board and the study area is being expanded for further channel delineation, groundwater evaluation and flow directions.

A bedrock topography map of the Sand River (73 L) Mapsheet was supplied to the Alberta Research Council for its surficial geology bulletin. Surficial geology maps and cross-sections were provided to the department's Water Resources Management Services for the Beaver River Basin study.

Cold Lake Seismic Monitoring Program: In response to local concerns over earth tremors in the Cold Lake region, the branch installed a ten-sensor seismic monitoring system near Cold Lake. The system features downhole seismometers, radio-telemetry to the base recording station and a playback system for field tapes in Edmonton. This system has been operational since November of 1981. Apart from field data collection and servicing, performed on a part-time contract basis, the program employs one technologist in data playback and compilation under the supervision of staff of the Department of Earth and Planetary Physics, University of Alberta.

Groundwater Resources Information Services: The branch actively enforced The Ground Water Development Act (revised in 1980) and its supporting regulations passed in 1981. Particular emphasis was given to proper well construction and development, and to drillers' reporting. Drillers' reports are an important source of information, as they provide groundwater data used routinely by the Groundwater Resources Information Service. The service is available to any group or person with hydrogeological questions or interest in the availability of groundwater -- quantity or quality.

To widen and expedite the dissemination of groundwater data, the branch took steps to expand and refine its data base and the service it provides. The branch's information -- ranging in nature from an incomplete driller's report, a professional observation on an individual well, to a full driller's report including lithology, geophysical log (gamma and electric) and chemistry -- was assembled in an index, microfilmed and distributed to interested drillers, consultants and regional offices of Alberta Agriculture. A quarterly update of this microfiche system was also designed. Furthermore, plans were made to microfilm more than 180,000 individual files.

TABLE 11

Groundwater Branch Summary

Programs	1980-81	1981-82
Groundwater Administration:		
Driller Inspections	938	683
Well Complaints	105	130
Drillers' Log Compiled	7,497	7,294
Groundwater Resources Information Requests	1,955	1,851
Services to Other Agencies:		
Number of Agencies	5	5
Wells Installed (piezometers)	21	150
Test Holes Drilled	25	23
Groundwater Inventory and Protection:		
Areas Studied	10	13
Piezometers and Wells Installed	10	12
Test Holes Drilled	15	52
Holes Cored	3	4

Microfiche information is made available, at minimal cost, to interested parties.

Through the Water Resources Act and other approval processes, the department makes more than 3,000 groundwater reports available to the public. A comprehensive 700-page bibliography of these reports has been prepared with reference to author, year of publication and map sheet. Most of the reports have been microfilmed and are available in microfiche format at a minimal cost. The bibliography is updated monthly and is available for purchase in paper and in microfiche forms.

Special Investigations: One of the branch's major ongoing projects is the cross-sectional study of deep bedrock formations crossing the Alberta-Saskatchewan boundary in the Cold Lake region. Requested by the Prairie Provinces Water Board, the study is to be a comprehensive evaluation of the influence of deep well disposal in Alberta on groundwater in Saskatchewan and Alberta. This study was started in June, 1981, by a consulting firm, assisted by staff from the Groundwater Branch and the Saskatchewan Government. It is expected to form the basis for recommendations on monitoring requirements and data verification.

Other investigations included: salt water contamination of an aquifer near Opal, land subsidence in the Bindloss area, monitoring of Turtle Mountain, a high fluoride problem in the Grande Prairie area and other water well problems resulting from energy-related activities.

RESEARCH MANAGEMENT DIVISION

The Research Management Division (RMD) was formed in April, 1980, by combining two services: the Research Secretariat and the Alberta Oil Sands Environmental Research Program (AOSERP).

The Research Secretariat was the research management and administration arm of the department. AOSERP was an independent research program established in 1975 to fund, direct and co-ordinate environmental research in the Athabasca oil sands area of north-eastern Alberta. The amalgamation of the two into the Research Management Division not only combined the roles and functions, but also allowed for the development of more effective and better co-ordinated projects.

RMD provides a research support service to the department by funding, managing and reviewing research projects in the oil sands regions and non-oil sands regions; providing scientific advice to departmental staff; reviewing research reports and assessing their relevance to the department's responsibilities; representing the department on departmental, interdepartmental and interagency committees; co-ordinating interdepartmental and interagency research programs; preparing research review documents; publishing research reports; and operating the departmental library. The departmental library provides service directly to departmental staff and the general public.

Responding to the needs of rapidly-changing technology and demands for scientific information, the Research Management Division has changed in organizational structure from a functional to a program management mode which combines features of hierarchical and matrix management. This transition during the year eliminated the division's four separate scientific teams or systems (air, human, terrestrial and water) and their individual research management frameworks.

Apart from providing total integration at the subprogram levels, the program mode will ensure that an integrated approach is taken to all programs initiated by the division. The program management mode also ensures that all research generated by RMD is related to departmental priorities, objectives and goals. It has further flexibility in that reasonable adjustments can be made in research programs as departmental priorities change.

With the transition to the program management mode, the four systems are being retained only as a focus of expertise and for administrative convenience. The objectives of the new organizational structure, directed toward providing an integrated approach to environmental problems and issues, are:

-- to provide timely and authoritative information to other operational units within the department. Appropriate research and studies need to be undertaken with the full co-operation and collaboration of the operational units. When appropriate, other government departments, agencies, and industry will be fully involved in these tasks;
-- to devote the major part of the RMD budget to major research and development

programs which address the needs of the department;

-- to ensure that information generated by RMD is applicable to the development of strategic and long-term departmental operational plans; and

-- to generate or co-ordinate research output of such quality as to warrant national and international recognition.

To strengthen and ensure adherence to the new objectives of the Research Management Division, an External Advisory Committee of senior officials from various government agencies, industry and universities has been established. Under the new organizational structure, budgetary allocations will be made to research programs related to: AOSERP, acid precipitation, environmental contaminants, waste management, environmental assessment, energy systems, socio-economic analysis, risk management, environmental emergencies, reclamation and unsolicited and basic research.

Operational Activities: The research strategies developed by RMD scientists have aimed at improving the quality of research, and greater success in the incorporation of research results in Alberta Environment's programs and decisions.

RMD scientists usually review more than 100 research proposals a year, submitted to or solicited by the department. Staff members also review numerous research and project reports submitted to the department or committees of which they are members.

Most scientific research is conducted on a contract basis. In the 1981-82 year, a total of 98 contracts were processed. Sixty of these were for research projects contracted to consulting companies and universities. The remainder were service contracts related to reviews, publications, seminars and analyses. In addition, 16 research grants were awarded to Alberta universities and professional societies. Of these grants, four were used in conjunction with scientific symposia and conferences.

The results of these research activities appear in the 41 publications released by RMD over the year.

During 1981-82, RMD was represented on 40 committees. Eight were departmental committees and the remainder interagency or interdepartmental committees.

RMD staff also attended and presented papers at scientific conferences and meetings in various locations in Canada and the United States. In addition, the division sponsored workshops and seminars on various research topics.

An important aspect of divisional management has been the continuing development of both technical and managerial expertise and skills of the staff. RMD scientists attended several conferences or seminars and participated in management courses. Several prepared decision packages, and all initiated and maintained contacts with other scientists to keep abreast of current developments in science and management.

Field support staff in the division maintained operation through an office in Fort McMurray and a research facility at Mildred Lake in the Athabasca oil sands region. Responding to the needs of industry, RMD has allowed its facilities at Mildred Lake to be used by industry on a cost-recovery basis.

The Research Management Division is responsible for co-ordinating the department's research activities for the Alberta Environmental Centre at Vegreville. A number of projects have been identified for investigation at the Centre and RMD chairs the Technical Advisory Committee of the Centre.

As the new organizational structure was established after the start of the 1981-82 fiscal year, the following descriptions of divisional activities are based upon the former system approach.

Air System: The Air System managed research in the area of air quality, long-range transport of pollutants, urban air quality, and rural and industrial air quality.

In fiscal year 1981-82, a slight change in the Air System's research direction was implemented for the Athabasca oil sands. While the acquisition of baseline data decreased, new technology was used in remote sensing of the atmosphere. Research continues to be active into the transport and removal of air pollutants by atmospheric processes.

A fifth summer-precipitation chemistry project was completed with the co-operation of Alberta Environmental Centre and the Alberta Forest Service. The major ions and the heavy metals present in the precipitation were determined. This analysis has provided further documentation of deposition patterns over the Athabasca oil sands. The depth of the snow pack was surveyed again to supply a continuing record for climatological studies and to support on-going hydrological studies.

Studies to provide baseline information on air-quality trends in Edmonton and Calgary have been continued. An industry-government symposium/workshop on Acid-Forming Emissions in Alberta and their Ecological Effects was organized and its proceedings were published.

Air System managers represented the department on numerous committees dealing with transboundary air pollution -- particularly with concerns related to acid rain and long-range transport of air pollutants (LRTAP). An air system manager was named co-ordinator and spokesman for departmental activities on acid rain and LRTAP. A report was published on monitoring and research activities related to acid rain and LRTAP in western Canada.

Human System: The Human System was concerned with social impact assessment (including public participation), environmental education, human-biophysical environmental relationships, environmental health, environmental attitudes, and research management, policy and implementation.

The Human System almost completed its synthesis of the AOSERP oil sands data from the last five years. It also carried out a policy analysis of field data on family adjustment in the oil sands area. A staff member acted as program co-ordinator for the Alberta Forum on the Human Side of Energy.

System personnel also advised field staff of the department's Public Participation Branch and Planning Division in the evaluation of their programs.

Terms of reference for a health study in Fort MacKay have been reviewed and evaluated. Data from Fort McMurray has been reanalyzed and interpreted to help policy formulation by the New Town Planning Board in Northeast Alberta. A document on a research-management framework for the Human System was completed. Responsibilities of the Human System have been re-evaluated and established under a new mandate.

Terrestrial System: The Terrestrial System was involved in research in the areas of biological monitoring, reclamation, and effects of air pollutants on terrestrial ecosystems.

Reclamation research by Alberta Environment was co-ordinated by the Reclamation Research Co-ordination Committee, chaired by a Terrestrial System scientist. Another scientist continued managerial and administrative responsibilities with the interdepartmental Reclamation Research Technical Advisory Committee (RRTAC). In 1981, RRTAC committed approximately $1.5 million to reclamation research in the northeast oil sands region, in the coal-bearing region of the province's agricultural zone, and in the mountains and foothills.

The Terrestrial System has been conducting a review of reclamation research for Alberta. A bibliography of some 2,000 references, with computer-search capability, was prepared and work began on a synthesis report of references relevant to Alberta.

The Canadian Land Reclamation Association Letter was edited by a Terrestrial System research manager. Terrestrial System scientists continue to provide scientific expertise and management capability to other division managers and outside agencies.

Water System: Water System activities related to biological monitoring, surface water engineering, surface water quality, hydrogeology and ground deformation research.

Water system research projects in the 1981-82 fiscal year were conducted in six program areas: contaminants, waste management, surface water engineering, groundwater, ground deformation, and grants for graduate studies, workshops and seminar speakers.

Monitoring of the water quality and aquatic biota in the Athabasca oil sands area continued under the contaminants program. Other ongoing projects under this program involved research into lake phosphorus estimates and oil sands in-situ combustion products.

The waste-management program emphasized research in solid waste and wastewater management, with projects on sanitary landfills, sludge and sewage products. Research in the surface-water engineering and groundwater programs focused on developing an information base for numerical modelling. Surface-water engineering research addressed concerns relating to sediment transport, water conveyance, hydrology and hydrometrics.

Groundwater research included work on a model inventory and a proposed regional scale modelling of the hydrogeology and hydrochemistry of the Cold Lake oil sands deposit. Ground-deformation research continued into slope stability at Turtle Mountain and into induced seismicity related to in-situ fluid injection at Cold Lake.

Speakers were sponsored to present seminars on a variety of topics. Funds were contributed to the Plains Aquatic Research Conference at the University of Calgary.

LIBRARY SERVICES BRANCH

The Library Services Branch provides a research support and reference service to Alberta Environment staff throughout the province. It is also open to members of the public who have an interest in the environmental sciences.

The library is responsible for the maintenance and on-going development of an extensive collection of environmental reports and periodicals. At present, the library collection holds more than 25,000 books and reports, and more than 600 journal subscriptions. The library orders paid publications for departmental staff, provides a reference and interlibrary loan service, and develops the department's regional office library services.

The main library collection is located in Edmonton. A branch library has been developed for the Calgary regional office, and two office collections are housed in Lethbridge. The library maintains a reading room in Peace River, and has been assisting the Grande Prairie regional office in establishing a reading room for a small book and periodical collection. The main library shares resources with the library of the Alberta Environmental Centre in Vegreville by means of the interlibrary loan service.

Use of the library's resources continues to increase. More than 12,000 people used the library during the year. Library staff handled approximately 3,600 directional and quick-reference questions, and provided in-depth information for 540 questions. Eighty of these responses involved on-line (computer-assisted) bibliographic data base searches. Regional offices relied heavily upon the main library's collection and services.

Interlibrary loan service played an increasingly important role in providing access to other collections. More than 2,000 items were requested from other libraries, four times the number of items requested throughout the previous year. In addition, other agencies, libraries and consultants borrowed nearly 1,800 publications from the Environment Library, a 22 per cent increase over 1980-81. Regular borrowing service continues with the University of Alberta libraries.

The departmental libraries of Alberta Environment, Alberta Agriculture, and the Alberta Research Council have been working co-operatively on a library automation project (Sci/Tech). Since January 1, 1982, the Environment Library has been recording new additions on this computerized system rather than in the card catalogue. Some

4,000 records have been converted from cards to the Sci/Tech data base.

The comprehensive Bibliography of the Athabasca Oil Sands, Fort McMurray, Alberta Area: Socio-economic and Environmental Studies, published in January, 1980, has been updated.

WATER RESOURCES MANAGEMENT SERVICES

P. G. Melnychuk, P.Eng.
Assistant Deputy Minister

R. K. Deeprose, P.Eng.
Director
Technical Services Division

J. W. Thiessen
Director
Design and Construction Division

A. R. Strome, P.Eng.
Director
Water Resources Administration Division

Carl Primus
Director
Planning Division

F. G. Primus
Director
Operation and Maintenance Division

The service has the responsibility for overall management and control of the province's water resources.

The objectives of the service are to ensure that the multi-purpose water needs of Albertans are met, to solve water-related problems, and to provide associated engineering services as required by the department.

Policies and programs to meet these objectives are implemented collectively by the five divisions of the service. This is done by providing planning, engineering services and funding for the implementation of water development and control projects; enforcing The Water Resources Act; operating and maintaining water resources projects; and gathering, compiling, and analyzing hydrological information essential for an inventory and for effective provincial water management.

One of the major activities of the service is the implementation of the government's Water Management for Irrigation Use Program. This program involves the rehabilitation of irrigation headworks and canal systems and the development of water supplies for irrigation, industry, and other uses. The objective is to maintain a secure and continuous supply of water to irrigation districts and for all other uses.

Other major activities include: the implementation of a flood protection and water management plan for the Paddle River basin; implementation of a long-term water resources development scheme for the Vermilion River basin; development of an assured supply of good quality water in the Oldman River basin and implementation of a flow regulation reservoir on the Red Deer River (Dickson Dam), together with erosion and flood control works and development of a project to stabilize the water level of Lesser Slave Lake. The concept of river basin planning is a high priority.

The assistant deputy minister served as chairman of the Dickson Dam and Paddle River Dam Review boards which were appointed to review and advise the department on all technical aspects of the projects.

TECHNICAL SERVICES DIVISION

The Technical Services Division is responsible for providing the department with all necessary expertise in river flow forecasting, river engineering, surface water hydrology and surveying. It co-ordinates the department's operations in the physical assessment of the occurrence, control and effect of surface water in relation to natural phenomena, man-made works and proposed projects.

ALBERTA RIVER FORECAST CENTRE

The Alberta River Forecast Centre provides river forecasts for flood warning and optimum management of the major water resources of the province, including meeting the terms of the Prairie Provinces Apportionment Agreement.

Operational Forecasting: Weekly reports of streamflow conditions in Alberta were provided for departmental staff, governmental agencies, recreational organizations and other interested groups in the form of a weekly river report.

In 1981, runoff from the plains area snowmelt was below normal. No flooding problems associated with the plains area snowmelt were reported. Snowmelt in the mountains resulted in high flows in the Bow and Oldman river basins in late May and some minor flooding was reported.

Several periods of high flow as a result of rainstorms occurred throughout the summer. On May 15 a footbridge crossing Lee Creek in the town of Cardston was damaged and some 2,000 sandbags were deployed to hold back floodwaters. The coffer dam at the Dickson Dam construction site was threatened by two periods of high flow. High inflows into the Brazeau Reservoir in late July and early August necessitated the use of the Brazeau Dam spillway.

The Alberta River Forecast Centre issued eight high-water advisories over the course of the summer. Four were issued in May, two in June and two in July. At the request of Alberta Disaster Services a number of urban rainstorms were analyzed by the River Forecast Centre to determine their frequency. Seven storms were determined to have return periods of greater than 25 years.

Water Supply Forecasting: Early snow surveys indicated a below-normal snowpack and, therefore, below-normal streamflow was anticipated in the South Saskatchewan basin. Well-above-normal precipitation (200 per cent to 300 per cent of normal) in southern Alberta during May resulted in a substantial improvement in the water supply outlook. Rainstorms during the runoff season enhanced the water supply and no major water supply problems were reported. Low flows did, however, occur briefly on the Bow River below Bassano Dam in late August, but the problem was quickly resolved.

The River Forecast Centre issued Water Supply Outlooks in the months from March to August. A summary was issued in October.

A dry fall and low snow cover in the early part of the winter resulted in low winter flows on most rivers in Alberta. Unusually thick ice cover on Willow Creek resulted in water supply shortages for the

town of Claresholm in the latter part of the winter.

Climatic Network and Data Acquisition: Six more stations reporting precipitation directly to the River Forecast Centre have been added to the existing network. All stations are located in remote areas and rely on data transmission via GOES (Geostationary Orbit Environmental Satellite). The telemetered data-collection network in the Red Deer basin is now nearing completion and includes sensors for river stage, precipitation, temperature and other climatic data. This network will be used to provide operational forecasts for the Dickson Dam. Installation of the data-collection network to be used in conjunction with the Paddle River Dam to reduce flood damage on the Paddle River is under way.

In 1981 the River Forecast Centre began to receive data from three U.S. precipitation stations, operated by the Bonneville Power Administration in the St. Mary River basin, via GOES telemetry.

Special Projects: During the year, an operations manual was completed for the Waterton - St. Mary Headworks System and an operational strategy was drafted for the Paddle River Dam.

Investigations were carried out into the use of satellite imagery for operational forecasting. The River Forecast Centre receives satellite images on a regular basis from the Atmospheric Environment Service.

The use of snowpillow data in operational forecasting was also investigated and this data is now incorporated into several forecasting procedures. Other forecasting techniques were also refined to make better use of the expanding data-collection network.

Developmental work on a weather radar project continued throughout 1981 in conjunction with the Alberta Research Council.

RIVER ENGINEERING BRANCH

The mandate of the River Engineering Branch is to provide expertise in the dynamics of rivers and streams, and the associated problems resulting from human interference with the fluvial environment. The services provided by this branch relate to:

-- analysis of bed and bank stability of rivers and lakes;
-- river stabilization and erosion control;
-- floodplain analysis;
-- floodplain management and flood control;
-- ice jam monitoring and control;
-- assessments of gravel sites, pipeline crossings, bridges, culverts, intakes and outlet works.

Stability Analysis and River Erosion Control: Major erosion studies and protection designs were completed for several sites along the Red Deer River between Sundre and the Dickson Dam; Highwood River at High River; Sylvan and Pigeon Lakes; and Bearberry Creek. Apart from these major projects, 25 erosion studies of a minor nature were investigated and reported on.

Floodplain Studies: The objective of a floodplain study is to define the flood-prone areas along a stretch of a river or the shore of a lake. The results of these studies are utilized by regulatory bodies such as cities and planning commissions to control and restrict development in the defined flood-prone areas. During the year, floodplain studies were completed for Waskasoo Creek at Penhold and Elbow River at Bragg Creek. Work was initiated on revising and extending studies of the South Saskatchewan River at Medicine Hat and the North Saskatchewan River through Edmonton. A new study on defining the Bow River floodplain at Cochrane was started. The branch also analyzed a total of 167 subdivision referrals for flooding assessments for the various planning commissions in the province.

Calgary Floodplain Study: During the year, work was started on defining the flood hazard areas on the Bow and Elbow Rivers and the Nose Creek within Calgary. This study is important to the City of Calgary administration as urban development is encroaching on the flood hazard areas along the rivers. Surveying, mapping and a major part of the hydraulic analysis were completed for this study.

Ice Jam Monitoring and Control: Detailed freeze-up observations were carried out on the North Saskatchewan River upstream of Edmonton to assess the impact of a proposed change in winter operations for the Brazeau and Bighorn plants by TransAlta Utilities Corporation.

In response to a water shortage problem at Claresholm and Granum caused by extreme ice conditions on Willow Creek, the branch supervised ice-blasting operations to alleviate the situation.

Major efforts in ice jam mitigation (lane clearing, dusting and blasting) were concentrated at the Town of Peace River to guard against spring break-up problems. West Peace had previously experienced problems with high groundwater and wet basements because of high freeze-up levels and winter flows on the Peace River.

Spring break-up was also closely monitored at Fort McMurray.

Assessment: The River Engineering Branch helped to assess permit requests for gravel sites, pipeline crossings, water intakes and subdivisions. About 500 requests were handled during the year.

HYDROLOGY BRANCH

The Hydrology Branch is a specialized service group of 20 staff members responsible for providing hydrological engineering analyses of the surface water resources of the province. This responsibility includes the determination of annual and seasonal volumes of streamflow; the probability of occurrence and the hydrological characteristics of extreme events; and the provision of information and analyses for water management projects such as river basin planning, reservoir design and lake stabilization. The branch also assesses both the natural and man-altered

nvironmental characteristics affecting ydrology.

During the year, the branch answered ome 160 requests of a minor nature for ydrological analyses or technical reviews f hydrology reports for other groups in the epartment such as the Water Rights Branch, egional Services Branch, and the Design ranch.

Several major studies were conducted hich required significant commitments of anpower and resources, and represented mportant accomplishments of a technical ature. These included:

- reconstruction of historical natural flows at 100 locations in the South Saskatchewan River basin;
- analyses of floods for floodplain studies at Calgary and Medicine Hat;
- development of historical natural flows for the Battle River basin;
- water balance studies of several lakes for the development of management plans;
- assessment of hydrological models for use in estimating streamflow at sites with no recorded data;
- development of data and analytical techniques for assessing the feasibility of a reservoir of the Battle River;
- participation in a UNESCO project to review the world-wide development of hydroecological indices;
- derivation of lake evaporation data from 1912 to 1980 at 23 locations;
- development of basic hydrological knowledge from special studies of Spring Creek; for example, the derivation of a technique to determine effective drainage areas; and
- detailed study of methods to select the most appropriate statistical technique for flood frequency analyses.

The results of a hydrometric network valuation were presented in a technical aper at the 1981 conference of the Canadian ater Resources Association. The branch lso organized and participated in a Prairie ydrology Workshop sponsored by the Prairie rovinces Water Board.

During the year, branch activity hifted toward work of a more complex and engthy nature compared to that of previous ears.

URVEY BRANCH

The Survey Branch provides land and ater surveys to the department. Data ollected are used for the investigation, mplementation and management of epartmental projects, for the management of he province's water resources, and to ontribute to the data base of land survey nd hydrometeorological information.

Land Survey: This section provides ngineering surveys and arranges for legal urveys, aerial photography and mapping. urveys were provided for a total of 446 rojects. Of these surveys, a significant umber was provided through contracts with private survey firms and companies providing aerial photography and mapping services. The branch awarded 58 legal survey contracts at a total cost of $369,122, 17 aerial survey contracts at a cost of $356,395, and 37 engineering and control survey contracts at a cost of $665,936. Funds for these contracts were provided from the branch's operating budget and from funds allocated for major departmental projects.

By region, some of the larger projects carried out were surveys for:

Peace River	- Fairview water supply
	- Bechard Drain
	- Grimshaw Flood Control
Edmonton	- Paddle River Dam
	- Namepi Kennedy
Red Deer	- Buffalo Lake Stabilization
	- Gwynne Dam Site
	- Sheerness Blowdown Canal
Calgary	- Calgary Floodplain Study
	- Squaw Coulee Project
Lethbridge	- LNID (Lethbridge Northern Irrigation District) Main Canal and Keho Lake
	- SMRID (St. Mary River Irrigation District) Main Canal.

Water Survey: This section provides hydrometeorological data to the department with emphasis on the needs of the other branches of the Technical Services Division. Data are gathered by the field staff within the section and through two Federal - Provincial Cost Sharing Agreements.

During 1981, the following data-collection stations were operated by section staff:

-- Lake Level (220 stations)
-- Crest Stage Gauge (50 stations)
-- Miscellaneous Streamflow (80 stations)
-- Recording Streamflow (48 stations)
-- Snow Courses (97 stations)
-- Snowpillows (14 stations)
-- Non-recording precipitation (24 stations)
-- Recording precipitation (21 stations)

Five recording precipitation stations were installed by the Atmospheric Environment Service under the terms of the Federal - Provincial Cost Sharing Agreement for a cost of $6,111.

An additional 16 stations were constructed by Water Survey of Canada, which also continued operation of 421 stations under the terms of the Federal - Provincial Cost Sharing Agreement for a cost of $559,240.

An important highlight of the year was the continuation of the implementation of the real-time hydrometeorological network. Eight hydrometeorological stations were equipped with data-transmission facilities in Paddle River Basin, seven in the Red Deer Basin and eight in the rest of the South Saskatchewan Basin. The systems installed are proving to be very reliable.

Data-gathering activities in the Spring Research Basin and the Peace Athabasca Delta continued throughout the year.

DESIGN AND CONSTRUCTION DIVISION

The Design and Construction Division is responsible for implementing surface water development and control projects throughout the province. Major categories of these projects include: multi-purpose water supply, storage and distribution, major irrigation works rehabilitation, drainage, flood and erosion control and lake level stabilization.

The implementation of surface water development projects involves field investigations and the preparation of detailed plans in geotechnical, hydraulic and structural specialties. It also involves project management, contract administration, construction supervision and quality control. The division operates a materials testing laboratory and provides drafting services.

The Design and Construction Division may be directly involved in all phases of water development projects or division staff may provide budget and contract services only on major projects, such as the Dickson Dam, which are designed and inspected by private sector consultants. Typical water development projects are described in this section of the annual report.

Paddle River Dam: The Paddle River Dam under construction near Rochfort Bridge is funded by the Heritage Savings Trust Fund with project management services provided by the Design and Construction Division. Upon completion, the project will provide flood protection to some 12,000 hectares (30,000 acres) of farm land in the Paddle River floodplain.

Geotechnical design of the dam was completed by a consulting firm with field investigations, materials testing, quality control and design co-ordination by the Geotechnical Branch. The Design Branch provided hydraulic and structural designs for appurtenant works such as the low-level outlet works and the service spillway.

The Construction Branch is responsible for managing all major contracts and providing quality control supervision.

Stage I of the main embankment work, involving foundation preparation and the placement of 700,000 cubic metres of earthfill, was completed in December of 1981 at a cost of $3,246,630. A second contract was awarded for the construction of the low-level outlet works at a cost of $3,413,674. In addition to the tendered contracts, work continued on reservoir clearing, main access roads, camp facilities, utility relocations and dyking downstream of the dam site.

CONSTRUCTION BRANCH

The branch provides construction management and supervisory services for departmental water management projects.

During the year, it provided such services on 29 provincially-funded projects valued at $14,524,000.

The branch also provided services on 19 projects valued at $2,767,000 which were cost-shared with various municipal authorities, and on three projects funded by other government departments valued at $423,000.

Of the 51 projects carried out, 29 were on the basis of tendered contracts and 22 on the basis of equipment-rental agreements.

St. Mary River Irrigation District Main Canal: This project was undertaken to rehabilitate four kilometres of main canal to prevent further erosion to the canal banks and seepage from the canal. The project site is 17 kilometres from Lethbridge. In the first of two phases, a contract was awarded for the rebuilding of the outside canal banks at a cost of $1,300,000. The work is being funded by the Alberta Heritage Savings Trust Fund.

Grimshaw Erosion Control: This project was initiated to rehabilitate the outlet of an existing flood control channel, which was severely eroding, eight kilometres south of Grimshaw. The work consisted of the construction of two large rock drop structures to contain the water within a protected channel. The work was carried out on an equipment-rental basis at a cost of $210,000.

Pat's Creek Flood Control: This project was undertaken under a 75-25 per cent cost-sharing agreement with the Town of Peace River. The third of four work phases consisted of the installation of a large multiplate culvert designed to carry the flow volumes of Pat's Creek and to prevent the build-up of ice in the creek during the winter months. In the past, ice build-up caused blockages in the creek and subsequent flooding during the spring runoff. Phase III was carried out by contract at a cost of $1,100,000. The cost of Phases I to III completed to date is $2,800,000 while the total estimated cost of the project is $4,100,000.

DESIGN BRANCH

The Design Branch is responsible for the hydraulic and structural design of projects initiated by the department. This includes the preparation of preliminary design reports and detailed project designs complete with construction contract documents and cost estimates. Engineering services in the form of technical reviews and support are provided to other divisions and departments.

The branch also operates a diversified drafting service to accommodate the drafting needs of the department.

Hydraulic and Structural Design: The Hydraulic and Structural Section, in conjunction with the Geotechnical Design Section, prepared nine preliminary design reports and 21 detailed designs for projects with an estimated construction value of $6,700,000 and $27,100,000 respectively. Engineering designs prepared by consultants accounted for $17,700,000 of the latter figure.

The types of projects under preliminary and detailed design include drainage, flood control, erosion control, irrigation and lake stabilization. Several projects are multi-purpose in nature.

While not all projects are described in detail in this report, several examples are cited for information.

Namepi and Kennedy Creeks: Drainage improvements for these creeks in the Radway-Thorhild area, initiated in 1976, involve increasing the flow capacity of some 80 kilometres of the creeks. The total cost is estimated to be $8 million. During the year, 24 kilometres of channel were improved for a total of 48 kilometres as of March 31, 1982. Design and contract documents were prepared for four gabion grade control structures, for a total of 12 since the project began. The preliminary design for two additional gabion grade control structures was also initiated. A feasibility study for a nine-kilometre extension of this project on the Namepi Creek was also prepared.

Lethbridge Northern Main Headworks System: This system consists of approximately 80 kilometres of earthen canal and associated structures, beginning at the Diversion Headworks on the Oldman River and terminating in Keho Lake.

The project started in 1978 with the initiation of Rocky Coulee Syphon replacement. This component of the project was completed in 1981 at a cost of $2.8 million. The multi-phased Lethbridge Northern Headworks and Main Canal project will consist of some 15 contracts and is scheduled for completion in 1989.

Detailed designs and tender drawings were prepared for three contracts, for the Diversion Headworks, Oldman River Flume crossing and a three-kilometre canal reach extending from Rocky Coulee to Kenex Coulee. The total estimated cost for these works is about $22 million.

The contract for the Oldman River Flume crossing was tendered in December and awarded for $12.3 million.

Detailed designs were also initiated for Main Canal Reach 1, Reach 7A, Keho Lake dykes and the Turin Branch Headgate structure.

Pre-design reports were prepared for Monarch Branch Headworks replacement structure and Main Canal Reach 2, which extends from the Peigan Reserve north boundary to Willow Creek Flume crossing.

Drafting: The Drafting Section, with offices in Edmonton, Lethbridge, Calgary and Peace River, provides drafting services to the department in the form of topographical, structural, mapping and general drafting. Photo laboratory equipment was installed to improve service turn-around time.

Major projects during the year were the rehabilitation of the Lethbridge Northern Irrigation District Headworks and the Paddle River Dam.

GEOTECHNICAL BRANCH

The Geotechnical Branch is responsible for the air photo interpretation, geological engineering and the geotechnical investigations, assessments and designs on projects undertaken by the division. Contract documents and cost estimates are produced and project management is undertaken for projects that are largely geotechnical in nature. Engineering services, consulting

services and technical reviews are provided to other divisions, departments and agencies within the government.

Project management was provided by the Geotechnical Branch for the Lesser Slave Lake Regulation and Forty Mile Coulee Reservoir projects. On the Lesser Slave Lake project, design work neared completion on all of the proposed Lesser Slave River cutoffs and the low lake-level control weir. The feasibility study was completed for the Forty Mile Coulee project and the final design under way.

Geotechnical Design: This section of the branch is responsible for producing the geotechnical designs for the water resources projects initiated by the department.

During the year, the section completed a total of 13 final geotechnical designs for a variety of projects such as the Fairview Water Supply - Hay Lake Project, McAllister Creek Erosion Control, High Prairie Flood Control and Sulphur Lake Stabilization. In addition, the section completed preliminary designs for Mirror Reservoir, the Monarch Branch Headworks Structure, West Prairie River Erosion protection and the Sibbald Creek Control Structure.

Within the year, the section became extensively involved in the geotechnical designs of two major water resources projects. For one project, the section prepared a preliminary design for a dam on the Battle River. The proposed dam is a 30-metre high earthfill structure which is to impound water for multi-purpose use. For the second project, final designs were completed for the various components of the Lethbridge Northern Irrigation Headworks System. This project involves designing a new diversion headworks structure, enlargement and improvements to 80 kilometres of the existing main canal, and expanding the capacity of the storage reservoir at the downstream end of the system.

In addition to providing the detailed designs, senior staff members were appointed project managers for projects which were largely geotechnical in nature. Project management was provided for the Keho Lake Reservoir, modifications to the Belly River Diversion Weir, Manning-Notikewin River Bank Erosion Protection and Mirror Reservoir.

The section also performed several geotechnical reviews for other divisions within the department. The types of reviews varied from evaluating construction drawings for proposed sewage lagoons to assessing river bank stability studies and subdivision development proposals.

Investigation: The Investigation Section provides geotechnical input into site appraisals of existing and proposed water control projects.

The section's main activity is the conducting of site investigations which involve drilling, sampling, in-situ testing, instrumentation and monitoring of completed dams.

This past year, the section conducted geotechnical investigations on 20 projects; geotechnical investigations and instrumentation on one project for the Dam Safety Branch; and one granular search.

Materials Testing Laboratory: The section provides a material testing service in the laboratory and in the field, primarily for soil and concrete design purposes. It also provides quality control inspection services during construction.

During the past year, the laboratory completed work on 27 projects and provided quality control inspection on seven projects.

OFFICE OF THE DIRECTOR

The director of Design and Construction served as a member of the Irrigation Council, chairman of the Irrigation Implementation Committee and chairman of the Paddle River Implementation Committee. The director's office maintains a contracts administration unit and administrative and fiscal control of the Headworks and Main Irrigation Systems Program financed by the Alberta Heritage Savings Trust Fund.

WATER RESOURCES ADMINISTRATION DIVISION

The Water Resources Administration Division was formed on April 1, 1981, through a reorganization of the former Water Resources Management Division into two separate divisions -- the Operation and Maintenance Division and this division.

This division is responsible for the administration and enforcement of the Water Resources Act and Regulations and of the Drainage Districts Act, and for financial assistance to local governments under Position Paper No. 5 (Cost-Sharing for Water Resources Management Projects). These responsibilities are carried out by five branches: the Surface Water Rights Branch, Ground Water Rights Branch, Dam Safety Branch, Regional Services Branch, and the Administrative Support Branch.

WATER RIGHTS

The Surface Water Rights Branch and the Ground Water Rights Branch are responsible for processing applications under the Water Resources Act for licences to divert and use surface water and ground water. Terms and conditions for the licences are prepared through liaison with other agencies and with input from private individuals or groups. Files and plans are maintained for all projects and the quantity of water used for consumptive projects is maintained through a system of regular field inspections and mailed-in water-use reports.

SURFACE WATER RIGHTS BRANCH

The Surface Water Rights progress report shows a continued high level of activity with approximately the same number of applications as the previous year (see Table 12).

Major input from the Water Rights area was required for energy projects such as those of Esso Resources Canada Ltd. at Ethel Lake, Petro-Canada Exploration Inc. at Muriel Lake, Suncor Inc. and Alsands Inc. at Fort McMurray, Gregg River Resources Inc. and Cardinal River Coal Inc. at Luscar, and Union Oil Ltd. at Hinton.

After considerable review and analysis, a new licensing policy was developed for the Oldman River Basin. Outstanding applications are being processed according to the constraints developed for various types of projects covered by the policy.

Water Rights staff has been active in the water supply and demand studies in the Cold Lake - Beaver River area and the Battle River Basin.

Hydro-Electric Section: The Hydro-Electric Section is responsible for the administration of the Provincial Water Power Regulations under the Water Resources Act.

The 1981-82 year was a record for total hydro-electric generation with production at more than 2 million megawatt-hours.

A high volume of maintenance and renovation was carried out in 1981 by Trans-Alta Utilities Corporation. This work included construction of a spillway on Pocaterra Dam, repair and renovation to Three Sisters Dam, and replacement of a penstock at Cascade Plant. At the request of Parks Canada, renovations were also

TABLE 12

Surface Water Rights Progress Report

	Dom.	Mun.	Irgtn.	Ind.	Water Power	Other	Storage	Natural State	Dvrsn.	Total 81/82	Total 80/81
Applications Received	86	18	89	23	0	8	29	0	104	357	361
Interim Licences Issued	84	10	81	25	0	4	26	0	104	334	330
Licences Issued	128	11	53	16	0	0	11	0	77	296	393
Permits Issued	0	48	0	352	0	77	0	0	0	477	643
Transfers	309	16	78	10	0	0	0	0	12	425	182
Cancellations	71	10	83	19	0	0	12	0	13	208	152

TABLE 13

Surface Water Rights In Good Standing As Of March 31, 1982

	Dom.	Mun.	Irgtn.*	Ind.	Water Power	Other	Storage	Natural State	Dvrsn.	Total 81/82	Total 80/81
Applications	139	42	324	55	0	41	56	0	152	809	863
Interim Licences	1,038	84	764	128	1	263	164	0	514	2,956	3,002
Licences	4,746	139	1,561	193	8	28	68	0	259	7,002	6,731
Net Totals	5,923	265	2,649	376	9	332	288	0	925	10,767	10,596

TABLE 14

Ground Water Rights Progress Report

	Dom.	Mun.	Irgtn.	Ind.	Other*	Dvrsn.	Total 81/82	Total 80/81	Total 79/80
Exploration Permits Issued	18	34	4	58	7	0	121	103	114
Applications Received	15	34	2	28	14	0	93	128	145
Interim Licences Issued	20	68	2	25	31	0	146	470	513
Licences Issued	7	47	1	27	13	0	95	278	240
Transfers	2	14		1	1	0	18	29	6
Cancellations		4				0	4	8	2

TABLE 15

Ground Water Rights In Good Standing As Of March 31, 1982

	Dom.	Mun.	Irgtn.*	Ind.	Other*	Dvrsn.	Total 81/82	Total 80/81	Total 79/80
Applications	8	24	4	63	4		103	81	246
Interim Licences	79	506	11	213	170	17	996	962	716
Licences	16	132	11	30	437	5	631	545	255
Net Totals	103	662	26	306	611	22	1,730	1,588	1,217

* Includes other agricultural purposes

carried out at Canyon Dam to enable release of a steady flow of 15 cubic feet per second to Spray River.

Net hydro-electric generation for the last seven years was:

Year	Megawatt-hours
1975	1,415,000
1976	1,731,000
1977	1,518,000
1978	1,824,000
1979	1,408,000
1980	1,692,000
1981	2,027.000

GROUND WATER RIGHTS BRANCH

The Ground Water Rights progress report (Table 14) shows that branch activity was at a more normal level in 1981-1982 than in 1980-1981. The completion of the licensing of registered wells in the agricultural and municipal categories in the 1980-1981 year accounted for the difference.

During the year, the Ground Water Rights Branch co-ordinated the rewriting of the Ground Water Development Act which replaced the Ground Water Control Act. The responsibility for the licensing of water-well drillers was transferred to the Earth Sciences Division.

Field Inspections: The branch carried out a total of 177 field inspections over the year. The increase in inspections over the previous year reflected additional staff support. Of the inspections, 102 dealt with complaints or obtained information necessary for the processing of applications; 75 were final licensing inspections.

REGIONAL SERVICES BRANCH

Regional offices are located in Peace River, Edmonton, Red Deer, Calgary and Lethbridge. Staff from these offices inspect a variety of water-related problems. Requests for inspections are received from the general public, local governments and provincial government departments.

Regional staff personnel are involved with field inspections and the processing of inspection reports, the processing of permit and licence applications for non-consumptive water uses, the review of meetings with local authorities, public and other agencies, and the issuing of approvals for non-consumptive water uses.

The regional offices administer and manage the Cost-sharing for Water Management Projects program available to local authorities. Initiated in 1972 by the provincial government's Position Paper No. , the program was revised in 1980 to meet the growing needs of the province in water resources management. The cost-sharing ratio was changed to 75/25 per cent, where the province will provide a grant equal to 5 per cent of the eligible cost of the project. In addition, the responsibility for the engineering feasibility report was transferred to the local authority to allow for greater autonomy in choice of design. Eligible for grants under the program are projects which relate to flow regulation, flood and erosion control, water conservation, lake stabilization and water management on agricultural land.

The regional offices are responsible for preparing preliminary engineering and environmental reports under the Farm Surface Water Management Program. The program is designed to provide technical assistance to land-owners who wish to undertake drainage projects on an individual or small group basis. The regional offices also provide support to the Planning Division for studies on major river basins.

Staff in the regional offices initiate enforcement procedures when a possible violation of the Water Resources Act is discovered.

Table 16 summarizes regional activities for the year.

Peace River Region: Spring runoff was average for the third consecutive year. Although more snow fell than in the previous winter, the lack of moisture in the soil meant more water was absorbed into the ground. A heavy June rain caused problems in the Berwyn area. However, even with this storm, inspection requests remained constant.

The high water and ice levels on the Peace River in January aroused major concern and emergency preparations were made by the Town of Peace River.

In the Peace River Region, 175 inspection requests were received, the same number as in the previous year. Regional staff conducted 132 inspections and processed 123 technical reports. The Farm Surface Water Program accounted for 36 of the inspection requests.

Thirteen licences were issued for non-consumptive water-use projects. The regional office also issued a total of 70 permits and 29 letters of authority.

Under the Cost-Sharing for Water Management Projects Program, 15 preliminary investigations were conducted involving six improvements districts and three municipal districts. Sixteen projects were constructed or started within the year under the program.

Edmonton Region: A change in regional boundaries occurred during the 1981-82 year. As a result, responsibility for the Municipal Districts of Provost and Wainwright and the County of Flagstaff was transferred to the Red Deer Region.

In the 1981-82 fiscal year, 26 projects were implemented in the region. Three of these projects were funded totally by the province, while the remainder were cost-shared with local authorities under the cost-sharing program for water management projects.

There were 327 requests for inspections of water control and water management problems. During the year, 266 requests were processed. As of March 31, 1982, 126 requests were outstanding and required inspections.

A significant portion of the Edmonton Region's manpower was required for the processing and approval of permit and licence applications. The region received 54 drainage licence applications and 212 permit applications during the fiscal year. Fifty interim licences, 38 final licences

TABLE 16

Summary of Regional Activities - 1981-82 Fiscal Year

Regional Office	Inspections			Technical Reports Processed	Farm Surface Water Program Requests	Cost-Shared Water Management Projects	
	Requests**	Completed	Remaining			Under Study	Projects Started
Peace River	175	132	22	123	36	15	16
Edmonton	327	266	126	256	21	24	26
Red Deer	238	161	83	161	26	12	3
Calgary	154	107	77	72	6	8	4
Lethbridge	653	612	129	520	17	15	4
Total 1981-82	1,547	1,278	437	1,142	106	74	53
Total 1980-81	1,227	1,113	218	1,057	256	66	70

** Include inspections for Water Rights Branch.

and 213 permits were issued. The region also issued 43 letters of authority. As of March 31, 1982, 19 outstanding licence applications and nine outstanding permit applications required processing.

During the year, 21 requests related to the Farm Surface Water Program were received, 15 projects were dropped, nine projects were transferred to the Red Deer Region and construction was initiated on 14 projects.

Calgary Region: Snowfall in the Bow River Basin was normal during the winter of 1980-81. Most of the runoff in the foothills and prairies of the Calgary Region occurred before the end of March because of the mild winter. Conversely, the mountain runoff which usually peaks in early June did not occur until July. The delayed mountain snow melt combined with wet weather resulted in above-normal stream-flow conditions. By October 1, 1981, water storage in hydroelectic and irrigation reservoirs in the Bow River Basin was generally at a normal level.

Snowfall was normal during the winter of 1981-82 in the Bow River Basin. Precipitation in the Highwood and Elbow River Basins was below normal and was expected to produce stream flows much lower than the stream flows of 1981.

During the fiscal year, four water resources management projects were constructed under the Cost-sharing for Water Management Projects Program. Eight more projects were under investigation for possible future construction.

The Calgary region received 94 applications for permits and 26 applications for non-consumptive water-use licences. In response, 79 permits and 24 licences were issued by the region under the Water Resources Act.

The region received 154 inspection requests, undertook 107 inspections and processed 72 technical reports during the 1981-82 fiscal year. Under the Farm Surface Water Management Program, six requests were received and four designs completed.

Red Deer Region: A change in regional boundaries during the year transferred the Municipal Districts of Provost and Wainwright and the County of Flagstaff to the Red Deer Region.

The regional office received 238 inspection requests and completed 161 inspections, leaving 83 inspections outstanding. One hundred and sixty-one reports were processed.

Of the inspection requests, 26 related to the Farm Surface Water Management Program. Seven projects under this program were implemented and constructed.

Three water resources management projects were implemented under the Cost-Sharing for Water Resources Management Projects program and 12 projects were under study during the 1981-82 year.

Fifteen licences for non-consumptive water-use projects, 84 permits and 19 letters of authority were processed during the fiscal year.

Lethbridge Region: Timely rains during the early summer produced good to excellent crops across most of the Lethbridge region during 1981-82. The latter part of 1981 was very dry. Prolonged cold weather in January of 1982 resulted in completely frozen streams along the foothills. Consequently, Claresholm and Granum suffered serious drinking-water shortages. Late-season snowfalls improved soil moisture conditions and the potential for average stream flows in the spring.

In the fiscal year, the Lethbridge Region received 47 applications for permits and 16 for licences for non-consumptive water uses. In response, 47 permits and 14 licences, as well as 25 letters of authority, were issued by the regional office.

Inspection requests were up significantly with 612 carried out from a total of 653 requests received. The demand for this service was increased substantially by the Ross Creek Basin Inventory.

Under the Farm Surface Water Management Program, 17 requests were investigated and

12 reports completed for the applicants. There are other sub-surface drainage projects in the region for which individual farmers receive engineering assistance from Alberta Agriculture.

In regards to the Cost-Sharing for Water Resources Management Projects program, two projects reached completion during the year and the first phases of two other projects were undertaken. Three preliminary engineering reports for additional projects were submitted for approval and 12 projects were under investigation at year-end.

DAM SAFETY BRANCH

The branch is responsible for administering the Dam and Canal Safety Regulation (Alberta Regulation 351/78). Prior to constructing any water retaining structure, owners are required to obtain authorization from the Controller of Water Resources. The successful applicant receives an interim licence authorizing construction of a project based upon drawings and specifications submitted with the application. The Dam Safety Branch also monitors the safety of existing structures.

The controller refers projects eight metres or more in height or 62,000 cubic metres or more in capacity to the Dam Safety Branch for review. During 1981, this branch reviewed 62 applications for licences under the regulation. These included 25 applications from Ducks Unlimited (Canada); 10 from towns, villages or municipal districts and 27 from private farmers.

The Dam Safety Branch continued to monitor the construction of the tailings disposal dams for the oil sands mining industry near Fort McMurray and to monitor the construction of slurry pond construction for the coal industry near Luscar. The companies involved are required to submit performance evaluation reports for each construction phase of their dams to the Dam Safety Branch for review to ensure that the structures meet standards for seepage and stability throughout construction and operation.

Technicians from the Dam Safety Branch installed and monitored instrumentation at several sites including the Lethbridge Northern Irrigation District Headworks, the Carseland and the East Coulee Slide areas, and the Paddle River Dam.

Flood routing studies were carried out for the Glenmore, Chain Lakes and Milk River Ridge Reservoirs.

The branch received reports on two TransAlta Utilities Corporation dams -- the Kananaskis and Horseshoe dams.

Field inspections are a major part of the branch's work. In 1981, about 130 projects of 1,250 on file were inspected as part of the on-going inspection program. In addition, all of the major irrigation dams were inspected and all of the instrumentation was read.

ADMINISTRATIVE SUPPORT BRANCH

The Administrative Support Branch was formed in 1981-82 and comprises the Financial and Records Administrative Sections. It is responsible for the overall budget, financial management, general office administration, records control and contracts administration for the division. It also provides advisory support to Drainage Districts and Alberta Disaster Services (ADS).

The branch head worked with Alberta Disaster Services in co-ordinating the evaluation of storm and flood events and the appraisal of damage.

Evaluations were conducted of storm and flood events at Two Hills, Edmonton, Glendon, the Municipal District of Provost, Granum, Claresholm, Grouard, Peace River, Pincher Creek and Red Deer.

Damage claims were appraised at Two Hills, Pincher Creek and Red Deer. ADS rejected claims for Edmonton and Glendon.

Financial Administration: This section is responsible for the preparation of the yearly divisional budget, monthly budget forecasts, the processing of documents related to the purchase of and payment for goods and services, processing of all personnel and payroll documents, and maintaining inventory records which include fixed assets and furniture.

Records Administration: This section is responsible for the overall records management for the division. Records are stored in three main media -- paper, microfilm and computer. The Surface Water Rights Branch is responsible for the retrieval of computer data.

Paper records: 491 new files were created and 280 related reports were indexed. The section retrieved 20,267 files for users.

Microfilm: 1,430 plans were filmed producing 2,291 35-millimetre images on aperture cards. The filming of files produced a total of 133,362 16-millimetre images creating 7,074 micro jackets in the system. A total of 13,652 duplicate working copies of microfilm was produced from the security microfilm.

PLANNING DIVISION

The Planning Division provides the planning necessary for effective water resource co-ordination, development, and management. Specific responsibilities include river basin planning, water resource project planning, and benefit-cost analysis and environmental impact assessment of water resource management projects. The division comprises three branches: Southern Region (Oldman, Bow, and Red Deer River basins); Northern Region (North Saskatchewan, Athabasca, and Peace River basins); and Planning Services Branch, responsible for benefit-cost analysis, environmental impact assessment, and water demand forecasting. During the past year, division staff supervised 160 consultant agreements at a cost of $6,707,572. Major activities are summarized below.

RIVER BASIN PROJECT STUDIES

These studies are aimed at ensuring an interdisciplinary and multi-agency approach to major water resource projects.

Buffalo Bay - Horse Lakes Management Program: The purpose of this program was to develop a water and land management plan that would enhance fisheries, wildlife, and agricultural production while maintaining the necessary flow through the Buffalo Bay - Horse Lakes delta. The departments of Alberta Environment, Energy and Natural Resources, and Agriculture as well as Ducks Unlimited participated in a committee which developed three conceptual multi-purpose plans for the area.

Buffalo Lake Stabilization: This study investigated the feasibility of stabilizing Buffalo Lake for flood control and irrigation by pumping water from the Red Deer River to Alix Lake and passing it down a channelized Parlby Creek into Buffalo Lake. The component studies included engineering, groundwater, recreation, environmental (water quality, fisheries, wildlife), archaeological, social impact, and economics reports. All component reports are complete and the Phase II planning report was under way at year-end.

Fort McMurray Flood Damage Abatement: In June, 1980, Alberta Environment recommended to the Alberta Planning Board that unfinished nonstructural flood damage reduction studies be completed. The Fort McMurray Flood Control Steering Committee requested Alberta Environment to initiate such studies on May 25, 1981. During the summer of 1981, a joint City of Fort McMurray - Planning Division study team progressed toward the development of a comprehensive floodplain management study design. A detailed topographic mapping project was started on a contract basis in November, 1981. An economic consultant was retained in early February of 1982 to undertake a flood damage estimation study. By fiscal year end, both projects were 50 per cent complete.

Nose Creek Water Management: The purpose of this study was to develop guidelines for future water management in the Nose Creek basin. It involved delineating the floodplain, assessing water quality and quantity problems, determining land and

water uses, and preparing an environmental overview. The study report has been produced in draft form.

As a supplement to the Nose Creek study, a master storm drainage study was initiated because stormwater drainage from Airdrie and Calgary is believed to have a large impact on Nose Creek. The overall objective of this supplementary study is to achieve orderly urban development by providing a suitable and efficient storm drainage system, while utilizing Nose Creek for additional public benefits. The master storm drainage study, jointly sponsored by the City of Calgary and the provincial government, was nearing completion by a consulting firm by the end of the fiscal year.

Peavine Creek Flood Control: Agricultural flooding has been increasing in the middle reaches of the Peavine Creek basin. A planning study recommending solutions to the problem was completed. The recommendations were accepted for implementation by the scheduled construction of downstream works.

Pigeon Lake Control: In the summer of 1981, field investigations of lake sediment and vegetation were carried out concurrently with a questionnaire survey of cottage owners and farmers. In late 1981 the need for hydraulic survey data on Pigeon Lake Creek was identified. These data were collected in January of 1982, but severe weather inhibited progress and finalization of the study was delayed. The results of the studies and survey were analyzed in conjunction with the information provided by the lake level simulation model, and a draft report was prepared by March 31, 1982.

Sturgeon Lake Water Balance: This study was initiated to develop a hydrological model of the lake and its drainage basin for use in lake management studies.

REGIONAL WATER RESOURCE PROJECT STUDIES

These studies were made to help plan regional water resource management:

-- Blood Indian Creek Water Supply/Demand Analysis to determine whether there is adequate runoff to merit construction of a dam to supply stockwater and a limited amount of irrigation. A number of potential sites, including the Cabin Lake site, are being considered and reviewed with the Special Areas Board and area residents.
-- Blood Indian Irrigation Feasibility Study to determine the feasibility of irrigating about 10,000 hectares of land in the northeastern part of the Blood Indian Reserve. The study involves mapping, soil classification, agronomy, engineering, groundwater, environmental, social, economic, and institutional components.
-- Deadfish Diversion Project Study to determine the feasibility of a pump diversion from the Red Deer River to Deadfish reservoir for domestic and irrigation purposes. Construction of the Deadfish Diversion was planned to begin in 1982. Optimization studies were conducted to determine the most effective use of this facility in conjunction with the operation of the Sheerness power plant water supply system.
-- Economic evaluation of proposed projects to alleviate flooding at Debolt North, Donnelly, and Peavine Creek; to drain farmland and improve wildlife habitat at Whitford Lake; and to allow recreational development at Iosegun Lake.
-- Etzikom Coulee and Pakowki Lake Drainage Basin Studies to provide an overview of water management problems, issues, and concerns and inventory-related technical data. Overall data deficiencies led to the initiation of a streamflow monitoring and water quality sampling program. The geography, climate, and hydrological characteristics of the Pakowki Lake area dictate that a special approach is necessary to resolve the area's water deficiencies.
-- Island Lake Stabilization Study to determine the feasibility of stabilizing lake water levels. The study found that there was little opportunity to reduce the existing lake level range.
-- Oldman River Basin Drainage Study to inventory all available surface and sub-surface drainage systems with particular emphasis on grid systems. This report represents a co-operative effort among private contractors, Alberta Agriculture, and Alberta Environment.
-- Oldman River Basin Erosion Study to inventory major erosion sources and areas of instability, and recommend future planning actions. The study dealt specifically with the St. Mary, Belly, Waterton, and Lower Oldman Rivers down to the confluence with the Bow River.
-- Pincher Creek Study to sample water quality.
-- St. Mary Project Support Study to provide necessary planning information for the design of canal capacities, storage volumes, operational aspects, and future development of the irrigation rehabilitation program for the St. Mary River Project Main Canal and Forty Mile Coulee Pumped Storage Reservoir. The basic planning tool developed for this study is a sophisticated computer simulation model of the system which will provide ongoing information in areas such as operation, scheduling, and carry-over storage planning.
-- Sheerness power plant negotiations to arrange cost-sharing with Alberta Power Ltd. for construction and operation of its upsized water-supply system. The increased capacity of the system will supply additional water for irrigation and stockwater, and for the Town of Hanna. A local organization has been formed under the jurisdiction of the Special Areas Board to administer the irrigation development.
-- Shoal Creek - Goodridge Lake Basin Study to define causes and extent of flooding and drainage problems and to examine viable remedial measures and works in the County of Barrhead and the Municipal District of Westlock.
-- Sounding Creek Study to examine the present water supply and demand and to

inventory existing projects. This study is an extension of the Special Areas Water Management Study.

-- Vegreville Area Drainage Study to determine the technical, environmental, and economic feasibility of improving agricultural drainage for approximately 1,100 square kilometres in the headwaters of the Vermilion River system. The tentative completion date of July, 1981, was moved to July, 1982, because of extremely low runoff and inconclusive hydrological results from the flow-monitoring stations during 1980 and 1981. The economic feasibility study was completed.

-- Whitemud River Flood Control and Drainage Study to analyze the flooding problem. Although a preliminary report has been prepared, further evaluation of this problem continues.

RIVER BASIN PLANNING STUDIES

The study of a river basin as a complete system is an ongoing water resource planning function that defines interdependent water-related activities in the basin.

The result is a flexible water management plan for the basin, continually updated to meet new conditions but comprehensive enough to give a rational basis to develop specific projects. A basin plan includes an inventory of water supplies and recommended ways of resolving conflicting uses.

Athabasca River Basin Planning Program: This program will establish a framework plan to manage the basin's water resources. Surface-water supply and water-use overviews were completed.

Battle River Basin - Gwynne Reservoir: The Planning Report - Battle River Basin Study was submitted in April, 1981. The primary recommendation was that, in conjunction with the existing Coal Lake reservoir, on-stream reservoir development near the Village of Gwynne offers the best potential internal water management option. Gwynne reservoir feasibility studies were authorized to proceed in April of 1981 towards a December, 1982, report. Extensive mapping, drilling and flow monitoring, and field investigations were completed in 1981. The potential water-supply reservoir would require a 30-metre high dam to create 40 million cubic metres of storage in the upper reaches of the Battle River basin near Wetaskiwin.

Cold Lake - Beaver River Basin: This study will develop a framework plan for the long-term management of the water resources in the region likely to be affected by development of the Cold Lake oil sands deposit. Long-term surface and groundwater supplies were identified throughout the basin. Forecasts of water requirements for industry, municipalities, irrigation, and instream users (fisheries, wildlife, and recreation) were determined. Water balance and water quality models were set up and calibrated to assess potential water quantity and quality issues, and evaluate management alternatives.

Little Bow River Basin: Terms of reference were developed for a study to prepare a framework plan for future water management in the basin. Liaison was established with the water users through a public advisory committee in the private sector, and with other government agencies through a technical advisory committee. Several background documents in the areas of hydrology and river regime as well as a report on water management issues and concerns have been written. The study will be undertaken in two phases over the next three years.

Mackenzie River Basin Program: The Planning Division assisted in the department's participation on the Mackenzie River Basin Committee and was represented on the intergovernmental task force managing the cost-shared baseline studies program. The study program was concluded at an all-ministers meeting held in Edmonton on February 26, 1982.

North Saskatchewan River Basin: The water-demand component of the basin planning program was initiated in November, 1981, toward a completion date of July, 1982. A consultant was retained to analyze historical, current, and forecasted water use for 12 designated areas as input to a basin water balance model.

Peace River Basin: An overview of water resource planning needs was tabled with the Alberta Water Resources Planning Advisory Committee. The design of the Peace River basin planning program will be based on this overview. To measure the effectiveness of current programs in dealing with water problems, Improvement District 19 interviewed 300 landowners/operators and inventoried water-related problems. Results of this survey will be used in planning and operational decision-making.

Ross Creek Basin: Planning studies were conducted in the basin to provide a framework plan for future water management. Hydrological assessments were undertaken with the intent to extend available hydrological data through site inspection and interviews of local water users. Ongoing planning activities will facilitate the continued work of the Water Resources Administration and Design and Construction Divisions in the region.

South Saskatchewan River Basin Planning Program: This program will establish a framework plan to manage the basin's water resources. Phase II work continued and liaison was maintained with the management groups of major water users, members of the Legislature, the Caucus Committee on Water Management, the Alberta Water Resources Planning Advisory Committee, and other government agencies.

The natural flow data base was completed and the draft report is in progress. An inventory of structures was completed and more detailed work continued in relation to the irrigation districts. Studies were initiated into the yield-response functions of various crop types to moisture availability and into the economic impacts of moisture deficiencies on the irrigation farming community.

Compilation of an information base on municipal, industrial, agricultural, hydropower, recreational, and fisheries water

requirements is well under way. A study of the temporal value of water to hydropower generation on the Bow River system was completed. Work continued on both the testing of the revised water-balance model and the development of a predictive water-quality model.

An analysis of institutional arrangements for water allocation is under review and the analysis of institutional arrangements for pollution control is proceeding. The water management objectives document is complete and undergoing intra-governmental review. A report on the data management system needs for the planning program was submitted and work on developing a data management system continued.

Water Management in the Special Areas: The Phase II draft report summarizes the present conditions in Bullpound, Berry, and Blood Indian Creek basins; outlines the goals, programs, roles, and practices for water management; and discusses basin operation and responsibilities. The draft report is now under review.

SITE DEVELOPMENT PROGRAM

The site development program is administered by the Operation and Maintenance Division. Program objectives are to:

-- restore provincial water-management project construction sites to near natural conditions;
-- improve the appearance of existing and future provincial water-management projects; and
-- provide those minimal facilities necessary to cope with the public uses of the site.

Planning Division provides the planning support necessary to the program.

A concept plan (Phase I) was completed for Figure Eight Lake. Phase II detailed planting and layout plans were completed for Burnstick Lake, Driedmeat Lake, Cavan Lake, and Slater Park. Assistance was provided to the Operation and Maintenance Division for implementation of site programs at Waterton reservoir, Little Bow reservoir, and the Western Irrigation District canal.

Additional Planning Studies: The division worked on these additional studies:

-- Native plant materials study to determine the suitability of various native plant species for rehabilitation, reclamation, and site development projects in southern Alberta. Phase II was completed and the third and final phase is under way.
-- Two major management planning studies designed to control land-use practices and facility development on Dickson reservoir and McGregor, Travers, and Little Bow reservoirs. These studies were initiated in co-operation with the Red Deer and Oldman River Regional Planning Commissions at the requests of the Counties of Red Deer and Vulcan.

DATA BASE AND METHODOLOGY DEVELOPMENT

Environmental Assessment: Studies of instream flow requirements for aquatic life were continued in the South Saskatchewan River and Cold Lake/Beaver River study areas. The fishways evaluation was completed and recommendations for structural modifications were implemented.

The problems associated with fish passage at the des Roches and Coupe weirs in the Peace/Athabasca delta were reviewed and prototype fishways were fabricated for on-site testing in 1982. The Planning Division continues to provide environmental impact analysis for several of the large construction projects under way, most water resources projects, and basin planning studies.

Water Use Data: The graphic display of water user information was expanded to enable computer plotting of water use by location and magnitude. An input-output model was developed to forecast water use on a drainage area basis by using economic variables.

ADDITIONAL PLANNING SERVICES

Prairie Provinces Water Board Demand Study: Alberta continued its participation in the Saskatchewan-Nelson Basin Water Demand Study. Provincial inputs to sector reports were consolidated for agriculture, economics, and recreation. Work on the final drafts for the municipal and industrial, power generation, and environmental reports progressed. A draft of the final report was completed.

Eastern Slopes Integrated Management Plan: The North Saskatchewan River basin planner represented the department on integrated resource planning teams to refine Eastern Slopes zoning in the headwaters of the North Saskatchewan and Red Deer River basins. This work was undertaken as part of the evaluation of Brazeau Timber Development proposals to develop 623,000 hectares of forest resources on a sustained-yield basis in west-central Alberta. The Oldman River basin planner represented the department on an interdepartmental committee to refine the Eastern Slopes Integrated Management Plan for the Livingston/Porcupine Hills area.

POLICY AND PROGRAM REVIEW

Floodplain Management Program: A comprehensive floodplain management program has been under development for about three years. The intent of the program is to prevent loss of life and to minimize damage and disruption during floods through the co-ordinated action of provincial and local government agencies in discouraging future unwise floodplain development and protecting existing development where practical. A consultant's report submitted to Water Resources Management Services in June of 1981 was approved in principle. In August, 1981, the report was distributed as a discussion paper to all appropriate provincial departments, regional planning commissions, and major cities in the province. At the same time, the name of the program was changed from Flood Damage Reduction to Floodplain Management. Comments were received and a subsequent working paper was reviewed extensively within the service and approved in March of 1982 as the basis for

the final document to be circulated to other departments later in the year.

Irrigation Reservoir Shoreline Development: After site visits to various reservoirs operated by the Bureau of Reclamation in the United States, final main and summary reports were written. These reports describe a number of alternative management policies that could be used to control the development of private, institutional, provincial, and municipal recreation facilities along reservoirs in Alberta. A draft policy paper for consideration by senior staff and the Minister is being prepared.

Provincial Drainage Review: In January, 1982, division staff completed a discussion paper on the existing provincial programs and policies relating to drainage management. This paper included an evaluation of programs and policies and suggested a number of changes needed to develop a comprehensive provincial drainage program. In particular, traditional resource-allocation conflicts, such as wetland habitat management versus farm drainage, were discussed. Following an extensive in-house review, the paper was circulated to Alberta Agriculture in late March. Review of the paper by Agriculture staff will lead to a joint Environment/Agriculture position paper on drainage.

OFFICE OF THE DIRECTOR

The director was appointed to, or continued departmental representation on, the Alberta Hydro Committee, the Alberta Government Recreation Committee, the Prairie Provinces Water Board Demand Study, the Slave River Hydro Committee, the Resource Integration Committee, and the Alberta Water Resources Planning Advisory Committee.

OPERATION AND MAINTENANCE DIVISION

The Operation and Maintenance Division was newly formed on May 1, 1981, in response to a greater need for operation and maintenance services for provincially-owned water control structures and projects.

The new division is structured into three branches: Irrigation Headworks, Equipment and Materials, and Projects Management.

The Equipment and Materials Branch is a service organization providing warehousing, sales, equipment rental and material purchasing services to the Water Resources Management Services for the province's water management and development program.

Both the Irrigation Headworks Branch and the Projects Management Branch are project-oriented and provide operation and maintenance services for provincially-owned water projects.

IRRIGATION HEADWORKS BRANCH

The branch continues to operate and maintain the headworks systems which directly serve eight irrigation districts in southern Alberta. They are the St. Mary River (SMRID), Lethbridge Northern (LNID), Bow River (BRID), Western (WID), Mountain View (MVID), Leavitt (LID), Aetna (AID), and Magrath (MID) Irrigation Districts. Two additional irrigation districts, Raymond (RID) and Taber (TID), are served by water conveyed through the works of the SMRID. Approximately 314,000 hectares of land are irrigated by water diverted through provincial headworks.

Three other districts, the Eastern (EID), Ross Creek (RCID), and United (UID), have been unable to complete land title transfers thereby preventing proposed takeover of their headworks systems by the province. In the interim, the province has agreed to fund necessary rehabilitation work to ensure the reliability of the UID and RCID works. The Prairie Farm Rehabilitation Administration (PFRA) completed interim repairs to the Bassano Dam headworks for the EID and a canal replacing the Brooks Aqueduct under the terms of a 1973 federal/provincial agreement.

An agreement finalized April 30,1981, between the province and Peigan Band Council allows access through the band's reserve to the LNID provincial headworks, extra right-of-way for enlargement of the main canal through the reserve, construction of a new diversion weir on the Oldman River, and relocation and construction of a new flume over the river.

Work on the LNID canal rehabilitation program continued with the completion of the Rocky Coulee embankment in 1981 and, as a result of the agreement with the Peigan Band Council, a contract for the replacement of the Oldman Flume was let in February, 1982. Until the rehabilitation work is completed by the Design and Construction Division, the Irrigation Headworks Branch will continue to repair and maintain the existing works to assure the integrity of the system.

Preliminary findings from the remote control system installed on the LNID have indicated that the system works well. As a result, the installation of remote control

systems is under consideration for the Western, Carseland-Bow and Waterton-St. Mary systems.

Rehabilitation work on the Carseland - Bow system which serves the BRID consisted of one bridge replacement, several bridge repairs and the placement of bank protection and removal of silt from sections of the canal. Orthophotographic mapping of the canal from the headworks at Carseland to McGregor Lake was completed in 1981. Seepage control projects scheduled for the canal in 1982-83 have been delayed indefinitely because of land-access problems which have prevented surveying and instrumentation.

Negotiations have been initiated between the province and the Blackfoot Band Council in relation to outstanding right-of-way claims and more recent right-of-way requirements for the province's rehabilitation work for the Carseland-Bow canal.

Rehabilitation work on the RCID headworks began in the fall of 1981. The work was funded through a rehabilitation assistance agreement and included the reconstruction of dykes around Cavan Lake and rehabilitation of the main supply canal.

Rehabilitation work to the Mountain View - Leavitt - Aetna system included modifications to the Belly River diversion works and approach channel to alleviate erosion problems at the dam.

Major work on the Waterton - St. Mary system, directly serving the SMRID and MID and indirectly the RID and TID, included modification and repair to the St. Mary diversion tunnel valve. Other rehabilitation work was carried out during the year for gravel protection of banks, bridge repairs/reconstruction and bank protection at the Belly River Diversion.

Total delivery of water in the 1981 season by district was as follows:

St. Mary's River	-	450,000 acre feet
Bow River	-	306,000 acre feet
Western	-	107,000 acre feet
Lethbridge Northern	-	110,000 acre feet
Mountain View - Aetna	-	11,000 acre feet
Magrath	-	4,000 acre feet

EQUIPMENT AND MATERIALS BRANCH

Revolving Fund: The Water Resources Revolving Fund's function is to store materials for resale and to lease equipment to the department's Water Resources Management Services. Initially the fund operated with a $5-million statutory limit on the advance, but this was increased to $11 million to provide support for the Regional Utilities Program.

With warehouses in Lethbridge, Edmonton and Grande Prairie, a sales and leasing service is provided throughout the province. Inventories on materials total approximately $343,000 while equipment for leasing cost $4 million.

Central Vehicle Services: The vehicle co-ordinator for Alberta Environment administers the vehicle pool for the department throughout the province. Approximately 500 vehicles, such as 1/2 ton pick-ups, 3/4 ton pick-ups, suburbans, four-wheel drive vehicles, and crew cabs, were issued this year on permanent, seasonal and short-term bases.

Mobile Equipment Section: The Mobile Equipment Section provides an equipment pool service for both the Projects Management Branch and Irrigation Headworks Branch.

During the year, this section assisted in the relocation of a river channel and in building roads, site development and hauling gravel for the Projects Management Branch. The Irrigation Headworks Branch was assisted at St. Mary Reservoir in the hauling of gravel for erosion protection. The section was also active in river protection work at Red Crow Park on the Belly River near Stand Off.

PROJECTS MANAGEMENT BRANCH

The objective of the Projects Management Branch is to operate and maintain non-irrigation, provincial water-control projects to ensure maximum water-resource benefit for the people of Alberta. These dams, reservoirs and canals also create wetlands for wildlife habitat and lakes for water-based recreation.

Thirty-nine water control structures are operated by the branch. These structures provide flood control and assured water supplies for many towns and other users.

To ensure the integrity of provincially-owned structures, inspections must be performed annually and general maintenance must be done as required. In 1981-82, general and preventive maintenance was completed on 67 structures and 101 inspections were carried out at various projects throughout the province.

Major Maintenance: In the southern part of the province, water supply is limited and the branch aims to make the best use of available water. Stream maintenance and channel cleaning were required at Fort Macleod and De Winton. Repair of Little Bow Canal headgates at High River was necessary for water regulation on the Little Bow Canal.

In central Alberta, branch staff repaired eroded channels and placed rock bank-protection on Bearberry Creek, Paddle River and Pembina River. Stream maintenance was performed on approximately 11 kilometres of Pigeon Creek and less extensively on Spotted Lake, Sylvan Lake outlet and Wizard Lake to ensure unrestrained water flow.

Major maintenance in northern Alberta consisted of installation and repair of culverts, timber structures and rock bank-protection on Produzny Drainage, Ferguson Lake outlet, Keg River Drainage and North Manning Drainage. Brush cutting and burning along creeks and drainage canals was completed for 15 projects. Road grading was required on 40 kilometres of Spring Creek Road, the Sturgeon Lake Structure access and the Heart River Dams access roads.

Special Projects: The Towns of Claresholm and Granum experienced water supply problems in the winter because of a dry fall, lack of insulating snow cover for frost protection and very cold weather. This combination of factors caused Willow Creek, the source of water for both towns,

to freeze almost completely. The department assisted the towns by clearing ice to open the channel and restore flow in the creek.

At the request of Alberta Culture, the branch placed erosion protection at the Ross Archaeological Site, an ancient native meeting place on the south bank of the Oldman River near Picture Butte. Protection of the site was required to preserve important artifacts from destruction by the river.

Stabilization Projects: The Projects Management Branch is involved in two lake augmentation projects.

Gull Lake, 13 kilometres west of Lacombe, had steadily-declining lake levels from 1938 until 1976, when pumping operations began.

Lac Ste. Cyr, located 19 kilometres southeast of the town of St. Paul, declined 2.7 metres since 1959 before pumping began in 1978.

Both lakes are used extensively for recreational activities such as boating and swimming. Lac Ste. Cyr is also the source of water supply for the town of St. Paul. Target stabilization levels were determined to enhance the recreational potential of both lakes without flooding land-owners around the lake.

Table 17 illustrates the success pumping has had on increasing the water level in the two lakes.

Site Development Program: The objective of the Site Development Program is to revegetate areas which have been disturbed during construction of water-control structures. Day-use facilities are also established for the existing public demand for recreation.

Four new sites were developed in 1981-82. An extensive tree salvage operation was successful at the Dickson Dam located 19 kilometres west of Innisfail. More than 1,000 trees were salvaged from the future reservoir bed and transplanted atop the banks of the reservoir.

Four other areas, including Slater Park in Calgary, were further developed to provide public facilities and enhance the area for recreation. Ongoing maintenance was carried out at another 12 sites in the province.

Northwestern Alberta Erosion Control Program: This program involves the rehabilitation of drainage ditches and canals in northwestern Alberta to channel the maximum amount of water and minimize flood damage.

Eight projects were completed in 1981-82, including Gordey Drainage, Krawchuk Drainage, Whitburn Drainage and Jack Creek Drainage. This work involved installing nine drop structures, upgrading 35 kilometres of channel and maintaining 23 culvert crossings. More than 32 kilometres of brush were cleared and burned on drainage channels. To prepare for construction projects in 1982-83, four other areas were brushed and cleared.

Emergency Water Supply Program: The Emergency Water Supply Program was set up to assist in and supervise the pumping of water for communities with emergency water-supply problems.

In 1981-82, dry conditions in Alberta necessitated emergency pumping in High Level, Slave Lake, Grimshaw, Nampa, Fairview, Rycroft, Spirit River, Jean Cote, Eaglesham, Atikameg, Bluesky, Paddle Prairie, Blairmore, Crowsnest Pass, Bow Island, Viking, Alix and Elk Point. The Projects Management Branch helped with pumping operations, and the Equipment and Materials Branch supplied pumps and pipeline at cost to the communities.

TABLE 17

Projects Management Branch - Lake Augmentation Projects

Lake	Date Pumping Began	Lake Level Before Pumping (ft.)	Lake Level 1982 (ft.)	Stabilization Level (ft.)
Gull	Apr./76	2,948.83	2,949.52 (Mar. 10)	2,950.0
Lac Ste. Cyr	Oct./78	2,113.56	2,116.68 (Feb. 8)	2,117.5

ENVIRONMENTAL CO-ORDINATION SERVICES

H. W. Thiessen, P.Ag.
Assistant Deputy Minister

D. G. Harrington, P.Ag.
Director
Land Reclamation Division

John King
Director
Land Assembly Division

K. R. Smith
Director
Environmental Assessment Division

The service promotes the integration of land-related resource development and environmental management to further the department's goal of balancing environmental quality and industrial development.

This goal is supported by requiring environmental impact assessments for major developments, issuing development and exploration reclamation approvals, maintaining liaison with regional planning commissions and the Energy Resources Conservation Board, through administration of restricted development areas, and purchase of lands for government programs such as environmental and water-resource development projects.

During the past year, divisional staff noted an increasing awareness among citizens and municipalities seeking information about the environmental effects of resource development. This, in turn, has resulted in the industrial sector taking more action to conserve and reclaim Alberta's land resources, and reduce negative impacts on citizens.

The Land Reclamation Program under the Heritage Savings Trust Fund continued its activities in research and in the reclamation of abandoned and derelict industrial lands. A total of $3,575,397 was invested in reclamation, of which $1,193,390 was for research.

Energy-related developments continued to dominate the environmental impact assessment (EIA) and referral procedures. The EIA system was reviewed by a task force representing industry, land-owners and special interest groups. Findings were integrated with the Energy Resources Conservation Board public hearing process.

Major land purchases were made in the Calgary and Edmonton Transportation and Utility Corridors. Detailed purchases, varying land values and a general resistance by land-owners placed considerable strains on the department's land-purchasing capability. Expropriations and protracted negotiations continued to dominate purchase activities.

Total expenditures by the service funded by the General Revenue Fund were $44,046,226. Of this amount, $120,708 was for the administration of the assistant deputy minister's office. The service negotiated, on behalf of the Government Land Purchase Fund, land purchases amounting to $44,343,827. In addition, expenditures on projects funded by the Heritage Savings Trust Fund and administered by the service totalled $8,376,518.

LAND RECLAMATION DIVISION

The Land Reclamation Division administers The Land Surface Conservation and Reclamation Act and the regulations under the act including: the Land Conservation Regulations, the Regulated Coal Surface Operations Regulations, the Regulated Oil Sands Surface Operation Regulations, the Regulated Oil and Gas Pipeline Surface Operation Regulations, the Security Deposit Ministerial Regulations, the Regulated Lake Shoreland Development Operation Regulations,the Sand Gravel Clay and Marl Surface Operations Regulation, Part 3 Administration Transfer Regulation, the Land Conservation and Reclamation Council Administrative Jurisdiction Regulation, the Stop Order Appeal Regulation and the Inquiry Procedure Regulation.

The act requires that land development and reclamation be planned to maintain subsequent capability. These regulations involve the review of dispositions, applications and impact assessments of proposed surface-disturbing activities and the granting of conditional approvals which ensure that reclamation standards are achieved. The objective is to provide maximum practical protection for the maintenance of shorelands, watercourses, valleys, sensitive watershed and alpine areas, and rural lands.

In addition to the administration of this legislation, the division carries out inspections, reclamation projects and special studies to enforce and improve the practice and standard of reclamation and environmental planning.

The Surface Reclamation Fund which is administered by this division consists of security deposits in the form of cash, securities and letters of guarantee required to ensure satisfactory reclamation on projects for pipelines, coal exploration and development, and oil sands exploration and development. See the Financial Statement at the end of this annual report for information regarding security amounts received and refunded.

Total expenditures for the division were $2,281,062.

LAND CONSERVATION AND RECLAMATION COUNCIL

The council, established by the Land Surface Conservation and Reclamation Act, is composed of reclamation officers who monitor surface disturbances to ensure satisfactory reclamation. The reclamation officers may issue orders for reclamation of disturbed lands and certify that reclamation is satisfactory. The council's jurisdiction includes all of the 76 counties, municipalities, special areas, Metis colonies, Native reserves and parts of improvement districts. The total cost of its operations was $1,176,116.

The 19 provincial reclamation officers and 150 municipal government reclamation officers issued 193 reclamation orders, up three from a year earlier, and 1,331 reclamation certificates, up from 1,177 the previous year, for the reclamation of abandoned well sites, pipelines, battery sites, mines, quarries and similar sites.

Sixty-one reclamation certificates were issued on coal exploration approvals, up from 50 a year earlier. Seven reclamation certificates were issued for oil sands exploration approvals. This was the first year that reclamation certificates were issued for coal development projects -- four were issued.

Crown Mineral Disposition Review Committee: This committee was established under Part 2, Section 15, of the Land Conservation Regulations (Alberta Regulation 125/74).

The greatest portion of the committee's work was spent reviewing petroleum and natural gas licences and leases which resulted in a total area of 1,483,341 hectares being offered for sale by public tender.

Exploration Review Committee: This committee was established under Part 3, Section 19 of the Land Conservation Regulations 125/74. The committee reviewed coal exploration applications referred by the Land Conservation and Reclamation Council. Proposed exploration locations and methodology were reviewed to ensure that environmental concerns were addressed and the programs complied with the Coal Development Policy for Alberta. Eighty-two new programs were approved during the year, with the emphasis on plains deposits.

DEVELOPMENT AND RECLAMATION REVIEW COMMITTEE

Established under Part 4, Section 21 of the Land Conservation Regulations 125/74, the committee's purpose is to provide an interdepartmental and interdisciplinary detailed technical review of major proposed regulated surface-disturbance operations. The committee then recommends operational terms and conditions to be attached to the development and reclamation approvals issued by the minister. The committee submits its recommendations to the chairman of the Land Conservation and Reclamation Council.

During the 1981-82 fiscal year, the committee reviewed or began to review the following applications for development and reclamation approvals:

-- Esso Resources Ltd. -- Cold Lake project: an application for development and reclamation was reviewed;
-- Forestburg Collieries Ltd.: plans for Paintearth Mine development and reclamation are under review;
-- Fording Coal Ltd. - Edmonton Power: an application for development and reclamation of the Genessee Mine is under review;
-- Cardinal River Coals Ltd.: an application for the Plant East development is under review.

Development and reclamation approvals were issued to the following (amendments to existing approvals are noted):

-- Gregg River Resources Ltd. (plantsite amendment);
-- Fording Coal Ltd.: Shaughnessy Underground Test Mine;
-- Manalta Coal Ltd.: Vesta Mine (mine extension amendment);
-- TransAlta Utilities Corporation: Highvale Mine;
-- Luscar Sterco Ltd. (mine plan amendment);
-- Union Oil Company of Canada Ltd.: Obed-Marsh Plantsite.

The committee conducted a review of the route selection for the eastern leg of the Alaska Highway Gas Pipeline.

It also updated and rewrote the guidelines for submission of development and reclamation applications.

RECLAMATION BRANCH

This branch is responsible for the reclamation of abandoned or derelict lands; the investigation of material-handling techniques relating to the reclamation of surface-disturbance operations; and the provision of a soil sampling and analysis service to the department and to the Land Conservation and Reclamation Council.

Reclamation Projects: Through the Alberta Heritage Savings Trust Fund reclamation program, lands at 129 project sites were returned to various beneficial uses (see Table 18). Eighty-three projects were located on municipally-owned land, 46 on Crown lands.

The majority of projects on municipally-owned lands were for the reclamation of abandoned garbage dumps (24) and abandoned sewage lagoons (22). In addition, abandoned bridge piers were removed from the Bow River within the Calgary city limits at six locations.

The mine site reclamation program was very active in the Forestburg, Bow City and Taber areas. At the Forestburg North site, revegetation of the area progressed well and the land has been leased to local farmers.

The Forestburg South reclamation agreement with Manalta Coal Ltd. and Alberta Power was accelerated and completed a year early. As a result of this cost-sharing agreement, ownership of more than 240 hectares (600 acres) of land will be transferred to the Crown.

Revegetation efforts at Bow City continued with the cultivation and preparation of the land for seeding in 1982.

TABLE 18

Reclamation Projects

Nature	Municipal	Public	Green Area	Total
Access Roads			26	26
Sewage Lagoons	22			22
Garbage Dumps	24		1	25
Mine Hazards	5			5
Sand and Gravel	6	5		11
Seismic Lines			3	3
Water Reservoirs	3		1	4
Industrial Sites	6		10	16
Dams				
Refineries	2			2
Abandoned Bridges	6			6
Coal Mines	9			9
Total	83	5	41	129

Work was initiated at the Taber mine site in late 1981 with completion expected in 1982. This abandoned mine is being reclaimed as a park for Taber and area residents.

The soil sampling and analysis section evaluated 1,547 soil samples from 142 sites for the division (see Table 19). Eighteen reclamation research projects were also undertaken during the year.

TABLE 19

Soil Sampling Program

Type of Site	No. of Sites	No. of Samples Taken
Abandoned Coal Mines	3	499
Ash Plots	36	36
Gravel Pits	2	8
Pipelines	8	393
Well Sites	51	584
Other		127
(Battery Sites)	4	
(Lagoons & Dumps)	37	
(Coal Exploration Sump)	1	
Total	142	1,547

REGIONAL LAND USE BRANCH

The branch assesses and evaluates major land-use allocations including public land-use assignments, subdivision developments and industrial sites. The branch's objective is to prevent the irreversible allocation of high-quality agricultural, recreational, and high-water-yield lands and quality waterbodies to incompatible uses. Total costs associated with this function were $265,426.

Subdivision Referral System: Major urban residential, country residential or cottage resort developments and all proposed subdivisions adjacent to waterbodies were reviewed and assessed for potential impact.

The eight regional planning commissions, the provincial planning division, and the cities of St. Albert and Lethbridge refer applications to this branch. The branch comments on behalf of the department on compliance with the Land Conservation Guidelines, susceptibility to flooding, bank and slope stability, erosion hazard, surface drainage, availability of a domestic groundwater supply, potential air and water pollution, and the suitability of the soil for sewage disposal. Comments lead to recommendations for refusal or conditional approval.

The County of Parkland No. 31 became a subdivision-approving authority on April 1, 1981, and as a result subdivision applications are now reviewed for this municipality.

Cottage resort and country residential proposals adjacent to lakes continue to create potential overcrowding and sewage problems. Proposals were under review for major lake subdivisions at Gull, Island, Lac Ste. Anne, Laurier, Moose, Nakamun and Sturgeon lakes. Much time was taken reviewing these applications with developers and discussing the potential implications of sewage contamination, erosion due to vegetation removal, and physical overcrowding and overuse of the lakes.

The number of applications processed decreased from 2,488 in the previous year to 2,156 (Table 20).

Staff represented the department at Alberta Planning Board hearings throughout the province as a result of appeals by subdivision applicants.

In addition to subdivision referrals, staff reviewed development permit applications for various rural municipalities including the counties of Leduc, Lac Ste. Anne, Strathcona and Wheatland, and the municipal districts of Foothills and Rockyview.

Lake Shoreland Regulations: The branch continued the administration of the Regulated Lake Shoreland Development Operation Regulations which were proclaimed on August 24, 1977 (Alberta Regulation 233/77).

These regulations are pursuant to sections 21, 23 and 25 of The Land Surface Conservation and Reclamation Act. Specified areas around the following 14 lakes were subject to the regulations: Baptiste, Garner, Island, Isle, Lac La Biche, Lac La Nonne, Lac Ste. Anne, Moose, Muriel, Nakamun, Sandy, Skeleton, Sturgeon and Wizard.

Fifteen subdivision and development applications were affected by these regulations. Six proposals were determined to be not subject to the regulations and two proposals were issued development approval.

Development of land for industrial or recreational purposes and unsubdivided land to be used for residential development will not be allowed until a lake management plan and lake management land-use bylaw have been completed and adopted.

Staff was active in the preparation of lake management plans with the various planning authorities. Plans were completed for Isle, Lac La Nonne and Lac Ste. Anne.

Baptiste and Skeleton Lakes were removed from the schedule of regulated lakes on July 29, 1981, and Moose, Muriel, Nakamun, Sturgeon and Wizard Lakes were removed on December 16, 1981, as all requirements of the regulations had been met.

Industrial Plant Sites: Due to a continued demand for petrochemical products, staff was involved in the review of numerous environmental impact assessment reports submitted by proponents. Siting criteria were reviewed for 15 proposed projects in the Edmonton, Red Deer and Calgary areas.

REGULATED OPERATIONS BRANCH

The Regulated Operations Branch prepared the operational terms and conditions for the development and reclamation approvals for major pipelines and gravel operations. In addition, the branch provided major input into the review and approval of development and reclamation

TABLE 20

Subdivision Referral Activities

Planning Authority	Number of Applications 1981	1980	Percentage Change
Battle River Regional Planning Commission	136	113	20
Calgary Regional Planning Commission	234	331	29
Edmonton Regional Planning Commission	275	450	39
Oldman River Regional Planning Commission	182	138	32
Palliser Regional Planning Commission	77	54	43
Peace River Regional Planning Commission	218	317	31
Provincial Planning Division	496	647	23
Red Deer Regional Planning Commission	355	302	17
Southeast Alberta Regional Planning Commission	100	112	11
City of Lethbridge	11	7	57
County of Parkland No. 31	64	---	--
City of St. Albert	8	17	53
TOTAL	2,156	2,488	13

applications which came before the Development and Reclamation Review Committee. The branch also reviewed major transmission-line applications and made recommendations for ministerial approval.

Branch representatives participated in the review of reclamation research proposals and in public advisory committees, and initiated a study into a regional drainage scheme for a major sand-and-gravel producing area.

Total expenditures of the branch were $630,427.

Linear Projects Section: In the last year, the electric transmission line and the oil and gas pipeline approval systems of the Regulated Operations Branch were combined under the newly-created Linear Projects Section. This section of the branch is now responsible for the department's review and approval of major electric transmission lines and oil and gas pipelines.

The section in the past year has increased the department's participation at Energy Resources Conservation Board (ERCB) public hearings for transmission lines and pipelines. In addition, the section has stressed the importance of environmental protection plans and of topsoil conservation to the pipeline industry. The department now requires a pipeline developer to submit an environmental protection plan which contains construction specifications for minimizing environmental impact.

Transmission Lines: Fifty-six applications for electric transmission lines and substations were reviewed in the year, for an increase of 11 applications from the previous year. Of these applications, 25 were for substations, 22 for transmission lines of 138 kV, seven for 240 kV lines and two were for 500 kV lines.

All electric transmission line and substation applications require the approval of the provincial environment minister as set out in Section 13 of The Hydro and Electric Energy Act.

The Linear Projects Section co-ordinates the government's environmental review of transmission lines prior to a utility company making application to the ERCB. Preliminary environmental data submitted by the company is forwarded to a number of government departments, whose concerns and comments are conveyed back to the company.

When an application is made to the ERCB, it is referred to Alberta Environment. This section co-ordinates an environmental review and provides comments and recommendations to the ERCB with respect to the potential environmental impact of the proposed transmission line.

Section staff members represent Alberta Environment at public hearings and cross-examine the applicants and interveners. The section assists in preparing decision reports and acts as advisor to the ERCB on environmental matters related to the project.

Pipelines: The section reviewed a total of 504 applications for pipeline projects in the province. Of this total, 43 applications required development and reclamation approval. The non-regulated pipeline projects which accounted for 461 of the approved applications were generally of small dimensions.

All applications were referred to the department by the Energy Resources Conservation Board. Non-regulated pipeline applications were reviewed within the department for compliance with the Land Surface Conservation and Reclamation Act and applicable regulations. Regulated pipeline applications were reviewed by the department and other government agencies that have concerns with the management of the province's natural resource base. The major regulated pipeline applications were subjected to

comprehensive review and met environmental standards before development and reclamation approvals were issued.

Sand and Gravel Section: Under the terms of the Sand, Gravel, Clay, and Marl Surface Operations Regulation, all large gravel pits in the province require development and reclamation approval. The application for approval requires plans showing how post-mining land conditions will be similar to existing land conditions and will be compatible with land uses of adjacent areas. On agricultural land, soil reconstruction may be required to ensure that agricultural capability after extraction is equal to or better than the existing capability. The Sand and Gravel referral system reviewed 72 proposals for development on Crown land. Development and reclamation approvals were issued for 33 operations out of the 48 applications received.

Coal and Oil Sands Section: The branch is represented on the Development and Reclamation Review Committee and the Exploration Review Committee and provides recommendations on the reclamation aspects of development proposals. Concerns of other departmental agencies may also be handled by the branch. In addition, the branch assisted the Land Conservation and Reclamation Council in the co-ordination of the review and preparation of responses for coal and oil sands submissions not referred to the two committees.

The branch also participates in the periodical inspection of mining operations and provides the reclamation officers with professional and technical support.

LAND ASSEMBLY DIVISION

The Land Assembly Division is responsible for the purchase of lands, the management of restricted development areas (including environmentally-sensitive lands), the implementation of transportation and utility corridors, the appraisal and settlement of damage claims, and the inventory and reservation program.

In some sensitive areas of the province, land is designated as a Restricted Development Area (RDA), which requires the owner to obtain ministerial consent prior to changing the existing land use. Through this technique, the division is responsible for monitoring and directing land use toward the objectives of various environmentally-sensitive RDAs. In addition, the Calgary and Edmonton Transportation and Utility Corridors are being implemented. The division appraises and acquires land for the department and on behalf of numerous other departments to ensure environmental conservation and sound resource management.

The division provides an inventory and reservation service for the department whereby all Crown lands required for various departmental programs are specifically reserved for those purposes. A systematic review of all old reservations determines if they are still required. The division's work on an inventory of land owned and controlled directly by the department is continuing and land is reviewed with respect to current requirements.

LAND ACQUISITION BRANCH

This branch is primarily responsible for the administration of Sections 9 and 16 of The Department of the Environment Act and Section 84 of The Water Resources Act. Total expenditure of the branch, including costs of land, surveys, appraisals and administration, was $88,706,798. This amount includes expenditures on land purchased and incidental costs for the Heritage Savings Trust Fund and lands purchased which were funded from the Government Land Purchase Fund. (It doesn't include incidental costs for irrigation headworks.) The branch purchased land on behalf of the departments of Alberta Energy and Natural Resources, Environment, Culture, Recreation and Parks, and Transportation for historical sites, grazing reserves, flood control, watershed conservation, reclamation, parks, wildlife habitat and urban service corridors.

Large numbers of purchases were made in the Edmonton, Sherwood Park West and Calgary Restricted Development Areas for the Dickson Dam site, irrigation headworks project, County of Wheatland regional landfill site, and the Paddle River project. Land continued to be acquired for Capital City Recreation Park and for Fish Creek Provincial Park.

Access, Offers to Purchase, Easements, Damage Claims and Rights-of-Way: The total number of inspections and negotiations was 869 compared with 808 a year earlier. This total includes inspections and negotiations for 108 easements and 33 damage claims (down from 200). Fifty-eight easements were acquired for the Regional Utility Program.

Appraisals: In addition to 294 staff appraisals, 200 independent fee appraisals were commissioned to determine market land values for negotiating purposes. The independent appraisals on 35,525 acres (14,376 hectares) of land were undertaken by 30 different firms at a total cost of $208,519.

Surveys and Consultants: Thirty-five legal surveys were carried out by 19 private survey companies at a cost of $164,367. The major surveys were for the Edmonton and Calgary Restricted Development Areas, Dickson Dam, and the Vegreville Regional Utility Program. Other professional services were acquired at a cost of $525,177.

RESTRICTED LAND USE BRANCH

The Department of the Environment Act (Section 16) provides for the designation of Restricted Development Areas (RDAs) within the province. Thirteen designations have been made since 1974. The need for special environmental management in certain areas and the need for protection of transportation-utility corridor lands have been the two basic reasons for RDA designations, although the purposes for the various RDAs differ somewhat. Administration of the 13 RDAs is the responsibility of the Restricted Land Use Branch.

Within each RDA, subdivision and development applications and, in fact, any proposed land use changes are reviewed to determine whether they conform to the regulations set up for the particular RDA. Ministerial approval is required before any intensification or change in land use can occur.

During the past year, 270 requests for ministerial consent were received. Of these, 130 were granted approval, 14 were refused and 11 were of a minor nature and did not require consent. The remaining applications were either awaiting a decision, withdrawn, or regarded as information. The more active RDAs in the province, in terms of applications processed, were the Calgary and Edmonton RDAs (see Table 21).

TABLE 21

Ministerial Consents

Summary (April 1, 1981, to March 31, 1982)

RDA	Total Requests	Consent	Refusal	No Consent Required	P/W*	TOTAL 1974-81
Blue Ridge	1	1	0	0	0	4
Calgary	117	62	11	6	38	753
Capital City Park	0	0	0	0	0	23
Edmonton	87	30	0	3	54	237
Edmonton/Devon	22	16	2	0	4	91
Edmonton/Fort Saskatchewan	15	8	0	0	7	64
Fish Creek	2	0	0	0	2	11
Fort McMurray	6	3	0	0	3	33
Lethbridge	10	6	0	1	3	43
Pinehurst Lake	1	1	0	0	0	2
Sherwood Park	8	2	1	1	4	45
Strathcona	1	1	0	0	0	4
Turtle Mountain	0	0	0	0	0	6
TOTAL	270	130	14	11	115	1,316

*pending or withdrawn

Once designated, RDA boundaries are not entirely static, but may be refined as more information becomes available. Minor amendments involving small deletions of land or clarification of boundaries were made to the Calgary, Edmonton, Edmonton-Devon, Edmonton-Fort Saskatchewan and Sherwood Park West RDAs.

The Restricted Land Use Branch is actively involved in research studies related to RDA programs. For the Edmonton-Devon RDA, a study is under way to assess the physical and ecological characteristics of the North Saskatchewan River Valley. When complete, the study will be used to provide a basis for evaluating proposed land use changes in and adjacent to the river valley. For the Edmonton and Calgary transportation and utility corridors, a study is under way to identify interim and secondary land uses. Such uses will include only those activities that are compatible with primary uses and not prejudicial to the economic and efficient development of corridor lands for their primary use. This study will aid in the formulation of detailed land use plans for the open space and buffers within the corridors.

Transportation and utility corridor plans, for the most part, were finalized in 1979 and established primary uses in the corridors as: oil and gas pipelines, highways, buffers, electrical transmission lines, utility distribution lines and service roads. The Restricted Land Use Branch has also assumed more responsibility for interim property management, pending actual installation of the various primary corridor components.

TABLE 22

Land Purchases Within Restricted Development Areas

Restricted Development Area	Date of Declaration	Total Area (Acres)	1981/82 Acres Acquired	1981/82 Acquisition Cost	% Gov't. Owned
Blue Ridge	Dec. 18/74	207	-	-	-
Calgary	Aug. 17/76	202,673*	1,631	$45,250,750	22.45**
Capital City Park	Jan. 10/78	1,934	1	40,165	4.24
Edmonton/ Sherwood Park West	Oct. 3/74 (Feb. 20/74)	19,187	620	31,110,077	48.37
Edmonton/Devon	Oct. 30/74	8,233	-	-	2.15
Edmonton/ Fort Saskatchewan	Oct. 30/74	11,602	-	-	.37
Fish Creek	Feb. 28/73	1,022	6	550,287	97.05
Fort McMurray	Jul. 29/74	270	-	-	3.75
Lethbridge	Dec. 30/77	3,780	-	-	-
Pinehurst Lake	Mar. 27/74	175	-	-	-
Strathcona	Jun. 22/76	288	-	(214,540)***	95.39
Turtle Mountain	Aug. 25/76	1,455	-	-	-
TOTAL		250,826	2,258	$77,735,562	22.52

* The total land area in the Calgary Transportation and Utility Corridor within the RDA is 17,750 acres.

** The land purchased is a percentage of the corridor; not of the entire RDA.

*** Net of Market Value of Land Exchange $784,283 and Credit Adjustment on Prior Year Purchases $998,823.

Land Assembly Division

Land Costs

TABLE 23

1981-82 Division Land Purchases - General Revenue Fund

Purpose	Parcels	Acreage	Cost	Costs/Acre
Fish & Wildlife Habitat	13	982.18	$ 855,748	$ 871
Grazing Reserves	27	4,437.13	484,000	109
Historical Sites	1	.23	1,100	4,783
Landfill Site	7	31.39	76,249	2,429
Natural Areas	1	35.00	99,750	2,850
RDA - Current year acquisition	33	645.66	29,885,616	46,288
Recreation & Parks	14	1,411.01	1,587,760	1,125
Regional Utility	116	467.17	2,937,827	6,288
Water Management	39	897.76	312,404	348
Total 1981-82 Acquisition	251	8,907.53	$36,240,454	$ 4,068
RDA - Payments on prior year Purchases			2,131,839	
TOTAL	251	8,907.53	$38,371,839	

TABLE 24

1981-82 Land Purchases From
Alberta Heritage Savings Trust Fund

Purpose	Parcels	Acreage	Cost	Costs/Acre
Capital City Recreation Park	1	1.00	$ 40,165	$40,165
Fish Creek	1	5.67	136,000	23,986
Lesser Slave Lake	2	441.60	67,447	153
Irrigation Headworks Improvement	61	2,294.66	2,855,437	1,244
Paddle River Project	68	737.08	388,869	528
Total 1981-82 Acquisitions	133	3,480.01	$4,672,918	$1,002
Payments on Prior Year Purchases:				
Capital City Recreation Park			(214,540)	
Fish Creek			414,287	
TOTAL	133	3,480.01	3,687,665	

TABLE 25

1981-82 Land Purchases - Government Land Purchase Fund

Purpose	Parcels	Acreage	Cost	Cost/Acre
Calgary Restricted Development Area	16	1,495.96	$38,883,827*	$25,992
Edmonton Restricted Development Area	2	156.04	5,460,000	34,991
TOTAL	18	1,652.00	$44,343,827	$26,842

* Includes market value of land exchange ($4,360,400)

TABLE 26

1981-82 Land Purchases

Purpose	Parcels	Acreage	Cost
Heritage Savings Trust Fund Land Acquisitions	133	3,480.01	$ 3,687,665
General Revenue Fund Land Acquisitions	251	8,907.53	38,371,839
Government Land Purchase Fund Land Acquisitions	18	1,652.00	44,343,827
TOTAL	402	14,039.54	$86,403,331

ENVIRONMENTAL ASSESSMENT DIVISION

The division is responsible for the development, maintenance and co-ordination of the department's Environmental Impact Assessment (EIA) system. Related responsibilities are the co-ordination of public participation programs and provision of services to support the use of remote sensing technology in environmental and resource assessment.

EIAs are required for most major resource developments proposed in the province such as new oil sands mining projects, sour gas processing plants, coal mining projects, power plants, refineries and petrochemical facilities, pipelines, transmission lines, recreational developments and water resource projects.

The division and the Energy Resources Conservation Board (ERCB) prepared EIA guidelines which combine requirements for environmental and for technical and economic information, resulting in one comprehensive application for energy project approvals. Guidelines prepared and released by Alberta Environment and the ERCB were: (1) Guidelines Respecting an Application to Construct or Alter an Electric Transmission Line; (2) Guidelines Respecting an Application for a Commercial Crude Bitumen Recovery and Upgrading Project; (3) A Guide to the Content of Pipeline Applications; (4) A Guide to the Content of Industrial Development Permit Applications; and (5) A Guide to the Content of Sour Gas Processing Plant Applications. These guidelines are intended to help applicants identify, early in their planning, the type of information to be filed with applications.

Guidelines for thermal power plants and coal mines were being prepared and are expected to be released in 1982. The oil sands guidelines were the subject of a paper written by divisional and ERCB staff and presented to the UNITAR (United Nations Institute for Training and Research) Conference in Caracas, Venezuela. A second paper written by divisional staff was presented to the International Conference on Energy Use Management in West Berlin.

A major review was done of procedures for balancing resource development and environmental quality in Europe, with special reference to citizen involvement.

The division continued to give program design and technical support to the Hazardous Waste Management Program. A province-wide public information program was designed and implemented, involving many meetings with regional planning commissions, municipalities and groups. The emphasis was on describing and applying criteria for siting a waste treatment facility and responding to the information needs of the public. Site constraint maps for 60 of Alberta's rural municipalities were started and will be completed in 1982. Assistance was also given to developing a policy for hazardous waste management.

Staff managed the community evaluation portion of the Slave River Hydro Feasibility Study, working closely with residents of the study area to develop a community-based assessment of concerns and issues.

The division completed its commitment to the Canadian Council of Resource and

Environment Ministers in chairing the Environmental Impact Assessment Task Force. In previous years the task force reported to the council on trends and issues in impact assessment and opportunities for interjurisdictional co-ordination. At the 1981 annual meeting of council, the division presented a discussion paper on community impact assessment on behalf of the task force. The presentation concluded its assignment and the task force was then disbanded.

Divisional staff helped plan the Human Side of Energy Conference and made presentations at several sessions.

In preparation for the Western Premiers 1982 Meeting, the division helped formulate the department's position on transboundary environmental co-ordination among provinces, focusing on environmental impact assessment, air and water quality, hazardous waste and specialized laboratory services.

PUBLIC PARTICIPATION BRANCH

The Public Participation Branch is responsible for facilitating public involvement in the regulatory procedures which determine the balance between environmental quality and resource development for specific projects.

Environmental Impact Assessment: Communities were given information and advice on environmental issues and the regulatory process. Branch staff advised proponents on the requirements for public participation programs and monitored their programs for conformity to the intent of the EIA guidelines regarding public participation.

The branch assisted with citizen involvement in 26 industrial projects throughout the province. These consisted of 13 industrial development projects, six coal projects, five oil sands projects, one recreational project and one major transmission line project.

Branch staff responded to requests from individuals and community groups planning to intervene at Energy Resources Conservation Board hearings where EIAs were involved in the proponents' applications. Assistance was also provided to a number of community impact studies, growth assessments, advisory committees and local and regional groups.

Departmental Projects: Staff aided citizen participation in many departmental water resource projects including the South Saskatchewan River Basin Study; the Cold Lake - Beaver River Regional Water Resources Study; Lake Wabamun Watershed Advisory Committee; Paddle River Implementation Committee; Buffalo Lake Stabilization Project; Slave River Hydro Economic Feasibility Study; Lac La Biche Water Quality Study; Little Bow River Management Plan; Badger Lake Reservoir Expansion; Forty-Mile Coulee Reservoir Development and the Battle River Basin Plan.

The branch also continued to provide community information and support services for the department's developmental work on the Milk River Basin Study and the Lesser Slave Lake Regulation Project.

Assistance was provided to the Hazardous Waste Team Implementation Program and citizen involvement was included in the plans for a provincial program for the management of hazardous waste.

The total cost of branch activities was $480,588.

ENVIRONMENTAL IMPACT ASSESSMENT REVIEW BRANCH

The branch evaluates various projects to determine the need for environmental impact assessment reports, and co-ordinates reviews of the projects by government agencies. Thirty projects were referred to this branch for screening. They consisted of seven coal-related projects, three limestone quarries, two oil sands pilot plants, one transmission line, one recreational development, two water resource projects and 14 industrial plant proposals.

As a result of this screening process five new EIAs were requested making a total of seven EIAs under review by the branch. These EIAs were for four coal mines, two heavy industrial projects and one 500 kV electric transmission line. The remaining 25 projects were dealt with through permitting procedures of the department. EIA reviews were completed during the year for the Suncor Fort Kent in-situ pilot plant and the Cline River recreational development.

Environmental reviews were made of industrial siting studies prepared by companies seeking locations in Alberta and of specific industrial site proposals.

The branch determines the appropriate scope and content of EIA documents to ensure their relevance to decisions affecting resource development and evironmental quality. The branch initiated reviews of the community impact components of EIAs completed in Alberta and examined new concepts of community assessment and cumulative impacts.

Total expenditure for the EIA Review Branch for the fiscal year was $609,423.

ALBERTA REMOTE SENSING CENTER

The Alberta Remote Sensing Center provided services and facilities to Albertans using remote sensing for the survey and management of the province's natural resources and for exploration and development in northern Canada. Users were from the provincial and federal governments, educational institutions and industry. People from outside the province, where similar facilities do not exist, used the center as space became available. The center co-ordinated, promoted and funded remote sensing demonstration projects to establish cost-effective remote sensing techniques and applications for Alberta. The total costs of the center were $363,903.

Spaceborne Remote Sensing Program: The center assisted multi-disciplinary users with the acquisition, analysis and application of Landsat (resource satellite) data. The center's Landsat microfiche facility, image library, prime scene index and computer access to the federal government's Canada Centre for Remote Sensing technical information service provided users with

Landsat imagery of Canada and other technical information.

Airborne Remote Sensing Program: The center planned and co-ordinated projects between Alberta users and the Canada Centre for Remote Sensing to ensure the provision of data best suited to provincial needs.

Co-ordination and Extension: The Alberta Center provided users with specialized equipment, including an image analysis system acquired in 1982, and with staff assistance for analyzing Landsat and aircraft multiband imagery. The Center provided service on request to the Calgary and Lethbridge areas and other parts of the province. The center's education program presented briefings, lectures, workshops and displays throughout the province.

The 10th Alberta Remote Sensing course was conducted with participants from across Canada. Of particular value to government and private range-land managers was the successful completion of a joint Alberta and federal government Alberta Landsat range-land project. Three workshops on the subject were held in Lethbridge for range-land managers. The center will produce and distribute special satellite images on request.

FINANCIAL STATEMENT

ALBERTA ENVIRONMENT

BUDGETARY EXPENDITURES FOR 1981-82 FISCAL YEAR

REFERENCE NUMBER			PROGRAM/SUB-PROGRAM/ELEMENT	SUB-PROGRAM ELEMENT	PROGRAM TOTAL
01	00	00	Departmental Support Services		
01	00	01	Minister's Office	$ 141,268	
01	00	02	Deputy Minister's Office	395,569	
01	00	03	Financial Planning	239,229	
01	00	04	Financial Operations	570,219	
01	00	05	Personnel	335,530	
01	00	06	Office Support	498,318	
01	00	07	Systems and Computing	1,369,529	
01	00	08	Public Communications	257,160	
01	00	09	Management Training and Development	79,803	
01	00	10	Library	243,865	
01	00	11	Solicitor's Office	Ø	
			Total Departmental Support Services		$ 4,130,490
02	00	00	Pollution Prevention and Control		
02	01	00	Program Support	607,027	
02	02	00	Air Quality Management	2,347,575	
02	03	00	Water Quality Management	1,770,234	
02	04	00	Municipal Water and Sewage Management	147,894,407	
02	05	00	Earth Contamination	2,030,845	
02	06	00	Waste Management	5,245,207	
02	07	00	Chemical and Pesticide Management	1,554,614	
			Total Pollution Prevention and Control		161,449,909
03	00	00	Land Conservation		
03	01	00	Program Support	120,708	
03	02	00	Land Conservation and Reclamation	2,281,063	
03	03	00	Environmental Assessment	1,453,916	
			Total Land Conservation		3,855,687
04	00	00	Water Resources Management Services		
04	01	00	Program Support	93,316	
04	02	00	Surface Water Development and Control	90,698,957	
04	03	00	Water Resources Administration	1,964,270	
04	04	00	Operation and Maintenance	6,324,521	
04	05	00	Data Collection and Inventory	5,550,814	
04	06	00	Water Resources Planning and Co-ordination	8,274,873	
04	07	00	Groundwater Development	1,276,264	
04	08	00	Water Rights Administration	1,380,247	
			Total Water Resources Management Services		115,563,262
05	00	00	Environment Research		
05	01	00	Environmental Research Co-ordination	1,402,257	
05	02	00	Alberta Oil Sands Environmental Research	1,777,322	
			Total Environment Research		3,179,579

06	00	00	I.D.S.S. Land Assembly		
06	01	00	Program Support	1,812,981	
06	02	00	Environment	35,349,201	
06	03	00	Municipal Affairs	Ø	
06	04	00	Culture	1,100	
06	05	00	Recreation and Parks	1,587,760	
06	06	00	Energy and Natural Resources	1,439,498	
			Total I.D.S.S. Land Assembly		40,190,540
07	00	00	Interdepartmental Environment Research and Services		
07	01	00	Program Support	1,630,995	
07	02	00	Plant Sciences	977,536	
07	03	00	Chemistry	2,050,850	
07	04	00	Animal Sciences	1,825,482	
07	05	00	Environmental Technology	955,914	
			Total Interdepartmental Environment Research and Services		7,440,777
			Total Actual Expenditure for the Year		$335,810,244

NOTE: 1) This statement is made up from the 1981-82 fiscal E.S.R.P. reports, but is not an audited statement.
2) Element totals are only listed for Departmental Support Services. All other programs list sub-program totals.
3) Breakdown of expenditures corresponds to the approved Departmental Program Structure which differs from the current Organization Structure.

ALBERTA ENVIRONMENT

SUMMARY OF EXPENDITURES AND REVENUES
FOR THE YEAR ENDED MARCH 31, 1982

ALBERTA ENVIRONMENT PROGRAM EXPENDITURES		
Departmental Support Services	$ 4,130,490	
Pollution Prevention and Control	161,449,909	
Land Conservation	3,855,687	
Water Resources Management	115,563,262	
Environmental Research	3,179,579	
I.D.S.S. Land Assembly	40,190,540	
Interdepartmental Environment Research and Services	7,440,777	
TOTAL		335,810,244
ADVANCED EDUCATION AND MANPOWER EXPENDITURES ON BEHALF OF ALBERTA ENVIRONMENT		
Priority Employment Program (P.E.P.)	53,640	
Summer Temporary Employment Program (S.T.E.P.)	57,122	
TOTAL		110,762
HERITAGE SAVINGS TRUST FUND - ENVIRONMENTAL PROGRAMS		
Irrigation Headworks Improvement	15,916,024	
Land Reclamation	3,014,304	
Capital City Park	(107,660)	
Fish Creek Park	1,499,916	
Paddle River Basin Development	9,052,408	
Lesser Slave Lake Outlet	131,437	
TOTAL		29,506,429
TOTAL ENVIRONMENTAL EXPENDITURES		$365,427,435

STATEMENT OF REVENUE COLLECTED BY DEPARTMENT	
Water Diversion Permits	4,997
Water Well Drilling Permits	16,760
Water Power Rentals	363,103
Department Miscellaneous	389,607
Rural Water Development Program	2,490
Previous Year Refunds	1,066,460
Community Services Program	12,456,676
Industrial Water Diversion	47,328
Water Resources Revolving Fund	7,528,189
Brazeau River Development Cost Recoveries	4,418,328
R.D.A. Property Revenue	196,359
TOTAL REVENUE COLLECTED	$26,490,297

Note: Summary statements are taken from the 1981-82 G.S.R.P. reports and DPC 578 printouts. These statements have not been audited.

SURFACE RECLAMATION FUND

FINANCIAL STATEMENT

MARCH 31, 1982

Auditor's Report

Balance Sheet

Notes to the Financial Statement

ALBERTA LEGISLATURE

OFFICE OF THE AUDITOR GENERAL

AUDITOR'S REPORT

To the Members of the Land Conservation
and Reclamation Council

I have examined the balance sheet of the Surface Reclamation Fund as at March 31, 1982. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, this financial statement presents fairly the financial position of the Fund as at March 31, 1982 in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

C.A.
Auditor General

Edmonton, Alberta
September 8, 1982

SURFACE RECLAMATION FUND

BALANCE SHEET

AS AT MARCH 31, 1982

	1982	1981
ASSETS		
Deposits in trust (Note 2)	$3,892,416	$6,766,349
Securities in trust with the Province of Alberta	160,000	140,000
	$4,052,416	$6,906,349
LIABILITIES		
Trust Fund (Note 3)	$4,052,416	$6,906,349

The accompanying notes are part of this financial statement.

SURFACE RECLAMATION FUND

NOTES TO THE FINANCIAL STATEMENT

MARCH 31, 1982

Note 1 Authority

The Surface Reclamation Fund operates under the authority of the Land Surface Conservation and Reclamation Act, Chapter L-3, Revised Statutes of Alberta 1980. The purpose of the Fund is to hold security deposits received pursuant to the Act as an assurance that satisfactory land surface reclamation will be performed. Since all interest received by the Fund is allocated and subsequently paid to depositors, no surplus or deficit arises on the Fund's operations.

Note 2 Deposits in Trust

Deposits in trust consist of deposits in the Consolidated Cash Investment Trust Fund of the Province of Alberta.

Note 3 Trust Fund

Transactions in the Trust Fund are summarized as follows:

	Cash Deposits	Securities	1982 Total	1981 Total
Balance at beginning of year	$6,766,349	$140,000	$6,906,349	$6,382,697
Security deposits received	1,231,200	60,000	1,291,200	1,666,599
Interest received	717,416	-	717,416	737,201
	8,714,965	200,000	8,914,965	8,786,497
Security deposits returned	4,822,549	40,000	4,862,549	1,880,148
Balance at end of year	$3,892,416	$160,000	$4,052,416	$6,906,349

Note 4 Bank Guarantees

In addition to the deposits in trust and securities shown on the balance sheet, the Fund held bank guarantees as at March 31, 1982 in the amount of $15,995,495 (1981 $2,060,394).

Note 5 Approval of Financial Statement

This financial statement was approved by management on September 8, 1982.

WATER RESOURCES REVOLVING FUND

FINANCIAL STATEMENTS

MARCH 31, 1982

Auditor's Report

Balance Sheet

Statement of Operations and Deficit

Statement of Changes in Financial Position

Notes to the Financial Statements

ALBERTA LEGISLATURE

OFFICE OF THE AUDITOR GENERAL

AUDITOR'S REPORT

To the Minister of Environment

I have examined the balance sheet of the Water Resources Revolving Fund as at March 31, 1982 and the statements of operations and deficit and changes in financial position for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Fund as at March 31, 1982 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

C.A.
Auditor General

Edmonton, Alberta
September 14, 1982

WATER RESOURCES REVOLVING FUND

BALANCE SHEET

AS AT MARCH 31, 1982

	1982	1981
ASSETS		
Current:		
Accounts receivable	$ 881,298	$ 155,228
Materials, at cost	342,826	349,972
	1,224,124	505,200
Fixed:		
Equipment, at cost	4,052,803	3,449,179
Less: Accumulated depreciation	1,413,076	1,052,656
	2,639,727	2,396,523
	$3,863,851	$2,901,723
LIABILITIES		
Current:		
Accounts payable	$ 795,121	$ 341,014
Provincial Treasurer's advance	3,087,566	2,575,193
	3,882,687	2,916,207
Deficit, Statement B	(18,836)	(14,484)
	$3,863,851	$2,901,723

The accompanying notes are part of these financial statements.

WATER RESOURCES REVOLVING FUND

STATEMENT OF OPERATIONS AND DEFICIT

FOR THE YEAR ENDED MARCH 31, 1982

	1982	1981
Revenue:		
Material and gas sales	$7,339,427	$196,749
Less: Cost of goods sold	7,321,328	191,414
Gross profit on sales	18,099	5,335
Equipment rental	880,544	637,946
	898,643	643,281
Expenses:		
Operation of equipment	502,011	344,876
Depreciation	385,333	345,391
Shops	24,753	18,433
Equipment rental	6,875	3,891
Office supplies	5,676	6,159
Communications	4,057	3,772
Freight and postage	2,274	1,905
Other	1,761	1,772
	932,740	726,199
Operating deficit for the year	34,097	82,918
Gain on disposal of equipment	29,745	58,648
Deficit for the year	4,352	24,270
Deficit (surplus) at beginning of year	14,484	(9,786)
Deficit at end of year	$ 18,836	$ 14,484

WATER RESOURCES REVOLVING FUND

STATEMENT OF CHANGES IN FINANCIAL POSITION

FOR THE YEAR ENDED MARCH 31, 1982

	1982	1981
Funds were provided from:		
Increase in Provincial Treasurer's advance	$512,373	$ 540,002
Depreciation	385,333	345,391
Proceeds from disposal of fixed assets	36,385	60,243
	934,091	945,636
Funds were applied to:		
Purchase of fixed assets	635,177	1,082,175
Deficit for the year	34,097	82,918
	669,274	1,165,093
Increase (decrease) in working capital	264,817	(219,457)
Working capital at beginning of year	164,186	383,643
Working capital at end of year	$429,003	$ 164,186

WATER RESOURCES REVOLVING FUND

NOTES TO THE FINANCIAL STATEMENTS

MARCH 31, 1982

Note 1 Authority

The Water Resources Revolving Fund operates under the authority of the Water Resources Act, Chapter W-5, Revised Statutes of Alberta 1980.

Note 2 Significant Accounting Policies and Reporting Practices

(i) Depreciation is calculated on a straight-line basis over the estimated useful life of the assets at the following rates per annum:

General equipment	- 20%
Light mobile equipment	- 25%
Tractor units and heavy equipment	- 3 1/3 to 12 1/2%
Aluminum water pipe	- 6 2/3%
Small equipment	- 33 1/3%

(ii) Major overhauls, significantly extending the life of equipment, are depreciated on a straight-line basis over periods not exceeding five years.

(iii) Materials are valued at weighted average cost.

(iv) Certain administration and other costs are provided at no charge by the Province of Alberta and accordingly are not reflected in these financial statements. These costs include salaries and wages, certain overheads and the rental charges for the Edmonton, Lethbridge and Grande Prairie warehouses.

Note 3 Comparative Figures

The 1981 figures have been restated where necessary to conform to 1982 presentation.

Note 4 Approval of Financial Statements

These financial statements were approved by management on September 14, 1982.